



COLONY AND PROTECTORATE OF KENYA

DEPARTMENT OF AGRICULTURE
ANNUAL REPORT

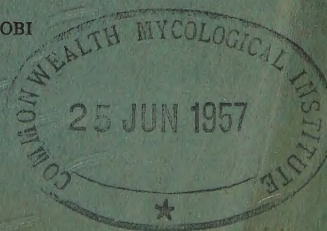
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Annual Report, 1955

TABLE B—DOMESTIC EXPORTS

Amend "1954" in heading on pages 9, 10, 11 to "1955".

TABLE D, page 22.

Cotton Lint. *Amend* figure in column 3 (Quantity) to read 10,786.

Page 52—Farm Planning, line 3: total acreage *should read* 145,343 acres.

Page 53.—*Amend* headings of last column of table to "Small Dams.
Cu. yds."

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DEPARTMENT OF AGRICULTURE ANNUAL REPORT, 1956

VOLUME I

PART I—AGRICULTURE IN 1956

Policy

It is now common knowledge that Kenya, particularly in the African areas, is undergoing the early stages of an agricultural revolution, the like of which is not to be seen in any other African Colony. Mr. G. W. Nye, Agricultural Adviser to the Secretary of State, has written in his report:—

“It is difficult to write briefly and in moderation about the developments taking place in African agriculture in Kenya to-day. It is most encouraging to see so much being achieved in such a short time and to find such a wonderful spirit of energy and enthusiasm imbuing the whole Department of Agriculture from the most senior to the most junior officers and to find such splendid co-operation existing between the Department of Agriculture and the administration at all levels.”

In the Central Province consolidation is proceeding so fast that it is in danger of getting beyond effective follow-up, and consolidation has been begun in the fragmented areas of Nyanza Province also. This means that, for the first time in history, it will be physically possible for many African peasant farmers to make a good living from their holdings—utterly impossible when they were composed of widely separated, small-sized plots under the old fragmented conditions. The results achieved to date are detailed elsewhere in this Report, but it may be said that they are the outcome of policy persistently pursued during the last six or eight years, which has gathered momentum as the Department was able to devote more funds and staff to the work, and which was finally given impetus by the report of the Royal Commission, and by the absence elsewhere of politicians and agitators during the Emergency.

Consolidation, however, is only a means to an end and not an end in itself. Indeed, it brings in its train very real dangers for which we must be prepared. Chief among these is that the peasant farmer may be inclined to flog his consolidated holding even more brutally than he was wont to flog his scattered fragments—because it is one piece and close at hand. To combat this it has been necessary to review the methods of follow-up which are the next stage once consolidation has been completed. The original intention was to plan thoroughly 10 per cent of consolidated holdings, but it has now become apparent that not only is it impossible to do this efficiently with existing staff and resources, but that to divert too much attention to this 10 per cent might result in disastrous malpractice on the remaining 90 per cent of unplanned holdings. The intention, therefore, is to provide, as far as possible, a simple basic layout for every consolidated holding, which African subordinate staff can understand and help the farmer to put into effect, while we shall continue to plan the small numbers of farms of first class farmers who may be able and willing to benefit from more detailed advice. The use of a simple layout also seems the most effective way of checking the refragmentation which is already a danger.

Hitherto, again, policy in all African areas has been based on a full subsistence plus some cash being produced from every holding, this in turn being based upon the natural desire of African farmers to provide their food needs without dependence upon others, or having to spend money on food. Consolida-

tion opens the door to the specialist, who may wish to put a larger proportion of his holding under various cash crops and purchase some or all of his food from elsewhere. This development is unlikely at present, but it must be envisaged, and we shall have to be ready with the answer when the need arises, both in technical knowledge of the right crops to grow, and with marketing facilities to sell them.

Coupled with consolidation is the necessity to educate the peasant farmer in methods of farming his nice new gift of a holding in one piece instead of in scattered fragments. To meet this need we plan to extend the Department's facilities for training farmers so that many hundreds can attend short courses each year at farm institutes; this project depends upon the provision of funds, and again it is the outcome of educational policy which has been tried out over the last few years on a less ambitious scale. The progressive farmer, in agreeing to consolidation or in having his farm planned, is looking first of all for greater security of tenure, and he is inspired by the example of others, whether it is the well-run European holding where he has worked for many years, the teaching of this Department, or a neighbouring African farmer. By spreading our educational facilities over a larger number of people we hope to create many foci of good farming from which sound principles will spread and become general practice. Several African districts, notably perhaps Kericho and South Nyeri, have already had an invaluable influence in this way.

Farm planning continues to make strides both in African and European areas, and here again the main difficulty in African areas has proved to be in the follow-up, while in the European areas the area planned is not as great as was hoped owing to lack of staff. A paper plan is of little value in itself and the tendency in African districts has been for the number of plans on paper to multiply beyond the capacity of field staff to provide subsequent supervision on the ground. It may be reckoned that it takes two years from planning before a holding is working efficiently and before the farmer has a full grasp of what he is aiming at. Close field supervision after planning is thus a necessity and not as easy to provide as is a plan on paper, where large numbers of small holdings are concerned. Lack of capital has also been a difficulty, as much for developing African farms as on European. A loan of £50 or even £100 does not go far towards developing 100 acres of good arable land at to-day's prices, and this is a position affecting many aspiring African farmers.

The Department's large research programme has continued to provide the "know-how" on which a great deal of this progress is based—though the enterprise of individual farmers, both African and European, must not be forgotten. In general, as a result of the last ten years of investigation, we are in the invaluable position of being a jump ahead of practice in most aspects of research. Notable exceptions are the irrigation schemes and in wheat breeding. The irrigation schemes have had, perforce, to be started without adequate knowledge of crops to grow or how to maintain fertility, and the wheat rust has outstripped the capacity of the plant breeding station to keep pace with it. Both these defects are now being remedied by the experimental stations attached to irrigation schemes and by an accelerated plant-breeding programme. The research programme is, and will continue to be, tied closely to field practice, both in respect of general farming and commodity stations.

We begin the New Year in the knowledge, sometimes very surprising to those who have striven unavailing in the field for many years, that African agriculture is making more rapid progress than would have been thought possible five, two or even one year ago. There are two major clouds on the horizon; one, that now we have achieved this position we shall not have the means, in man-power and money, to keep this progress moving steadily under control. The second, that we

shall over-produce a variety of crops and so render fruitless the hope of a better income for all. No one could say at this stage whether these dangers can be successfully overcome, but at least they are foreseen.

Weather

Climatic conditions were in general reasonably satisfactory through the year.

In Nyanza rainfall was up to the average but distribution was very local and in many areas unfavourable for crop production. In the northern part of the Province an excessively wet January and February prevented efficient land preparation, while most areas suffered from a dry June and July causing considerable damage to young crops at a crucial stage. During August and September heavy storms swept over many parts of the Province and accompanying hail caused damage to annual crops and also in some areas to coffee plantations. The weather was beneficial to the stock farmer but often caused anxiety to the planter and arable farmer.

The Rift Valley Province was affected by unseasonal rains in the high country during January and February which seriously reduced the wheat harvest, particularly on the Kinangop. Harvesting prospects at the end of the year were improved by dry weather.

The Central Province experienced unseasonal rains in January and February and although in general the average for the year was normal the long rains started late and following very heavy falls in April finished early. The short rains following a cold and damp *gathano* period were heavy in November but ceased in December until the end of the year. The short rains in Nyeri were poor, particularly in the lower locations but good in Embu and Meru.

In the Southern Province the short rains of 1955 continued well into February, 1956, with resultant good crops throughout the Province. The extensive grazing areas were enormously improved as a result. This was followed by extremely poor long rains and except in the Kangundo area of Machakos District crops failed. In Masai rainfall was slightly below average, but satisfactory crops were obtained in the limited areas of cultivation. The short rains of 1956 began about three weeks late but they have been well above average and crop prospects are once again satisfactory. The good harvest resulting from the 1955 short rains has carried the Wakamba through the year.

The Coast Province received excellent out-of-season rain in January which benefited perennial and tree crops after the failure of the previous short rains. Along the Coast well-distributed long rains ceased abruptly in July and thereafter there was very little rain for the rest of the year. Long rains crops, particularly maize, were good, but the short rains crops were a failure. In the hinterland the long rains were generally poor, with the exception of the area around Malindi, followed by patchy short rains. There was therefore a shortage of grazing and crops have been poor resulting in a general food shortage and famine in some areas particularly in the Lamu District. The Teita Hills had an unusual year nearly all the rain falling in the first four months, there being no normal dry season. This was followed by drought until the short rains broke in November when 32 in. were recorded at Wundanyi, of which 15 in. fell in two days. Elsewhere the rains were well distributed up to the end of the year. It was a good cropping year but conditions suited the army worm which damaged maize in the short rains.

(The Director of Agriculture is indebted to the Director of the East African Meteorological Department for the following detailed notes on weather conditions and for Table A which shows the rainfall over the main agricultural areas of Kenya during 1956.)

In almost all areas of Kenya the beginning of the year was considerably wetter than usual. In the Nyanza and East Rift the monthly totals for January were more than six times the average figure. Very heavy falls were recorded from Kakamega (9.16 in.), Mweiga (9.08 in.), and Kijabe, where the African Inland Mission recorded 8.13 in. Fairly heavy falls were also recorded from Ruiru with over 7 in. and Lumbwa with $6\frac{1}{2}$ in. In the Coast area, Mombasa recorded $7\frac{1}{2}$ in.

There was a general drying-out of the weather during February though in the East Rift and in the Kiambu/Thika Districts, falls were still well above average. In the Thomson's Falls area heavy falls were recorded, the Forest station reporting a total of 9.81 in.—over ten times the normal figure for the month.

During March and April, the first two months of the long rains, rainfall was quite good, although the totals were generally a little below average, but the month of May was considerably drier than usual and in many places the amount recorded was only a little over half of the usual figure. Sukari Limited at Ruiru recorded only 0.97 in. in the month and Naivasha 1.31 in. In the Nyanza Province and Trans Nzoia where the main rainy season does not come until later in the year, rainfall was about average.

Along the Coast, the East Rift and in the Central Province, June to September produced very little rain indeed and at Kipini and Malindi, in the Coast area, no rain at all was recorded during August. In the Nyanza and Trans Nzoia Districts the months of July, August and September produced a fair amount of rainfall which in the aggregate about equalled the average over the period. July was rather drier than usual, but this was compensated for by heavier than normal rainfall in September. In fact the rains continued into October, apparently to the detriment of those areas which normally expect the short rains to break during this month. For the remainder of the year Nyanza and Trans Nzoia areas had a rainfall of little below average.

The short rains in the East Rift, Coast area and the Central Province lived up to expectations during November when totals averaged about one and a quarter times the normal figure. However, the month of December was very disappointing and in many areas rainfall was less than 20 per cent of that normally expected; Malindi recorded no rain at all and other districts had to be content with totals of less than half an inch.

A summary of the monthly and annual rainfall for selected stations in the main agricultural areas is attached.

TABLE A.—RAINFALL OVER THE MAIN AGRICULTURAL AREAS OF KENYA, 1956

TRANS NZOIA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Endebess Elgon Downs 88·34/09 } Total Per cent	0·97 141	2·25 192	2·15 96	5·76 106	4·83 83	3·73 88	4·40 80	2·86 49	2·62 73	4·99 177	0·86 46	0·24 21	35·66 89
Kitale O. H. Knight 88·34/10 } Total Per cent	2·36 342	1·20 124	1·20 48	5·18 89	4·12 70	3·11 68	5·83 97	4·39 71	3·78 109	3·30 111	0·84 38	0·59 72	35·90 85
Cherengani Kipkoitet 88·35/05 } Total Per cent	5·94 771	1·84 121	0·28 10	3·47 63	6·26 114	5·24 122	6·78 102	6·98 111	3·06 81	3·35 134	0·66 31	0·22 18	44·08 103
Cherengani Aven Farm 88·35/13 } Total Per cent	5·33 888	0·78 69	0·57 25	5·70 109	3·45 75	3·27 73	9·27 167	4·58 69	3·79 109	4·19 151	0·77 37	0·27 21	41·97 105
H. Bridge Brindley Farm 89·35/05 } Total Per cent	2·97 303	0·64 39	2·53 94	5·52 87	4·82 79	7·34 137	2·89 38	10·68 139	3·99 96	2·17 94	0·56 25		

TABLE A—(Contd.)

WEST RIFT

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
	Total Per cent	Total Per cent	Total Per cent	Total Per cent	Total Per cent	Total Per cent	Total Per cent	Total Per cent	Total Per cent	Total Per cent	Total Per cent	Total Per cent	Total Per cent
Songhor Chematin 89/3513	3.74 198	3.22 136	3.66 101	8.43 102	6.15 76	3.07 65	4.41 76	7.68 118	5.50 113	5.20 129	3.56 90	2.33 82	56.95 100
Kapsabet D.C. 89.35/18	6.38 337	2.65 90	5.10 116	5.96 76	11.37 133	4.69 72	4.90 73	8.66 109	6.15 106	2.19 63	1.08 37	1.12 53	60.25 99
Molo Rly. Station 9035/18	5.33 459	3.40 188	1.84 49	4.64 66	3.04 55	5.04 106	6.65 119	6.44 91	4.44 116	2.49 103	2.44 73	0.45 17	46.20 95
Lumbwa Rly. Station 90.35/20	6.50 508	2.34 102	2.93 84	5.24 78	4.93 78	3.48 71	6.05 125	9.61 188				0.68 40	
Lumbwa Mt. Taragon 90.35/27	6.43 437	1.80 75	3.55 92	6.93 94	4.63 69	4.45 91	4.41 78	8.79 145	5.84 146	4.02 164	1.10 39	1.25 57	53.20 107
Londiani Egle- mont 90.35/78	4.23 465	3.75 288	2.29 79	6.79 88	4.96 80	3.64 68	6.92 118	10.16 143	3.68 79	3.25 151	0.69 37	2.32 95	52.68 109

TABLE A—(Contd.)
EAST RIFT

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Rumuruti Sugota Naibor 89-36/06 } Total Per cent	2-28 485	0-65 155	0-07 6	5-25 131	3-16 110	1-75 127	1-61 59	3-21 142	0-79 94	0-82 68	2-48 122	0-13 18	22-20 110
Thomson's Falls } Total K.C.C. Ltd. } Per cent	5-94 814	8-13 980	2-00 108	3-86 90	2-51 72	3-95 113	5-47 99	6-67 103	4-49 179	1-80 136	1-29 49	1-82 90	47-93 136
Nyeri P.W.D. } Total 90-36/17 } Per cent	5-55 345	2-48 152	2-67 101	10-70 150	3-86 56	0-67 53	0-89 64	1-10 73	0-90 73	2-51 72	2-96 69	1-39 47	35-68 99
Mweiga Estate } Total 90-36/72 } Per cent	5-47 288	2-60 171	4-62 164	7-45 134	3-23 69	0-54 43	1-29 85	0-86 49	1-03 98	1-07 40	3-47 88	4-46 134	36-09 113
Embu D.C. } Total 90-37/08 } Per cent	3-22 393	0-00	0-82 21	17-57 163	3-40 57	0-29 22	0-49 54	0-48 42	0-81 90	3-94 82	8-46 117	0-56 25	40-04 98

TABLE A—(Contd.)

RIFT

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Njoro Plant Breeding Stn. 90-3521	4.57 544	1.94 158	3.30 129	4.08 18	2.68 63	4.51 133	4.21 93	10.82 227	3.43 132	3.00 155	2.97 117	1.46 81	46.97 132
Solai Kemley House 90-3604	3.61 752	3.30 340	2.93 107	5.78 102	5.32 108	7.13 250	4.23 87	4.22 91	3.11 108	2.44 90	2.02 79	1.07 74	45.16 123
Kijabe A1 Mission 90-3615	8.13 432	2.46 113	3.67 88	8.32 98	2.19 36	1.04 59	1.03 113	0.36 34	0.74 77	0.66 33	1.48 53	0.04 1	30.12 85
Naivasha Expt. Stn. 90-3681	6.16 622	2.91 303	3.25 162	5.67 120	2.10 61	2.12 96	2.10 124	3.28 164	2.88 155	1.12 55	3.11 125	1.28 96	35.98 140
Subukia Robinhood Estate 90-3696	2.75 430	2.95 276	1.90 78	6.95 122	5.70 82	2.86 57	6.16 87	5.90 91	8.46 219	3.14 140	1.55 64	0.87 57	49.19 108

TABLE A—(Contd.)

NYANZA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Kakamega D.C. } Total 89·34/01 } Per cent	6·27 314	2·76 73	4·78 88	8·49 88	9·77 92	6·32 81	6·87 99	13·80 156	8·98 126	4·77 103	4·06 107	4·29 136	81·16 110
Yala Saint Mary's } Total School 89·34/31 } Per cent	6·88 289	1·75 57	6·83 122	13·08 124	7·62 75	4·92 77	3·62 73	8·73 142	6·24 105	6·74 146	4·66 90	3·83 109	74·90 109
Kisii D.C. } Total 90·34/01 } Per cent	3·25 138	0·61 16	2·19 36	11·13 112	13·65 164	5·84 105	3·20 76	6·50 109	7·93 131	9·43 187	5·06 96	3·49 87	72·28 109
Sotik Craigmore } Total 90·34/24 } Per cent	7·44 238	2·58 70	5·54 94	4·08 54	4·77 78	4·47 82	2·61 84	5·90 109	5·26 120	1·88 62	3·26 92	2·71 65	50·50 91
Kisii Murumba } Total 90·34/32 } Per cent	5·58 189	3·65 130	4·73 73	10·46 76	12·74 110	10·13 122	3·62 58	5·39 56	10·05 115	5·62 80	4·72 75	4·55 83	81·24 91
Maseno Siriba T. } Total 90·34/34 } Per cent	6·12 267	3·25 94	7·39 123	10·83 104	9·38 106	4·46 77	2·05 55	6·60 106	9·54 185	3·91 88	3·64 78	5·02 113	72·19 110

TABLE A—(Contd.)
MAIN COFFEE AREAS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Thika Bendor Plantations 90-37/47	4-35 431	3-58 273	4-84 125	10-32 111	2-41 55	0-07 6	0-58 75	1-49 177	1-56 169	3-23 118	6-47 109	0-76 24	39-66 111
Kiambu Kamundu Estate 96-36/14	6-48 388	5-95 272	4-91 92	7-00 63	4-64 58	0-68 27	0-25 21	0-41 28	0-88 55	2-92 87	5-30 88	1-04 28	40-46 84
Limuru Hope Farm 91-36/20	6-69 366	6-26 291	6-86 139	9-55 84	5-38 68	1-26 49	0-38 39	0-50 34	1-15 73	2-68 81	6-35 105	0-82 22	47-87 100
Ruiru Marula 91-36/31	3-63 333	2-24 175	3-25 91	5-54 71	1-89 47	0-23 17	0-47 80	0-71 74	1-11 112	2-26 92	5-44 111	0-83 28	27-60 86
Kiambu Kasarini 91-36/47	5-44 49	4-02 206	2-53 66	5-00 56	2-62 46	0-76 33	0-20 31	0-46 37	0-72 63	1-55 67	7-06 159	1-77 56	32-13 87
Kiambu Anmer Estate 91-36/60	6-19 696	4-23 269	4-08 105	7-74 72	3-07 47	1-03 48	0-27 25	0-57 41	1-36 93	2-52 97	5-60 108	0-57 20	37-41 91
Ruiru Jacaranda 91-36/84	3-90 348	3-50 507	4-83 169	8-98 86	3-20 62	0-88 42	0-54 68	1-01 81	1-33 83	2-62 96	5-58 133	0-61 18	36-98 102
Thika Chania 91-37/13	3-23 276	2-36 162	4-51 117	7-48 96	1-86 46	0-00	0-41 58	1-72 169	1-00 119	1-62 67	4-65 89	0-65 27	29-49 91
Donyo Sabuk La Finca 91-37/15	7-98 550	3-93 298	3-78 77	7-07 78	0-38 15	0-00	0-06 37	0-24 92	0-13 35	2-00 81	11-18 107	2-16 50	38-91 100
Mitubiri Chui Estate 91-37/53	3-81 410	1-39 111	4-12 109	4-01 47	1-04 30	0-00	0-18 51	0-20 54	0-50 147	1-17 64	8-16 127	1-83 49	26-41 84

TABLE A—(Contd.)

COAST

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Witu Plantations } Total 92-4003 } Per cent	1-68 198	0-52 217	0-12 8	5-64 136	9-17 76	5-90 99	1-93 59	0-17 7	1-18 63	0-35 15	5-28 178	3-19 76	35-13 84
Lamu } Total Meteorological } Per cent Station 92-4001	0-99 550	0-00	0-00	0-68 14	5-97 42	3-08 49	0-70 27	0-04 2	0-95 85	0-12 8	0-00	0-16 14	12-69 36
Malindi Kakoneni } Total 93-3908 } Per cent	3-39 477	1-31 327	6-26 288	2-94 98	2-70 39	2-33 97	1-46 94	0-15 10	0-72 34	0-72 22		4-32 129	
Kilifi Ganza } Total Disp. } Per cent	5-34 774	0-67 149	2-94 187	1-40 34	2-57 30	2-16 102	0-80 44	0-26 15	0-22 9	0-37 11	4-87 149	7-45 224	29-05 87
Mariakani Vet. Camp 93-3917 } Total Per cent	8-43 1240	0-10 14	6-89 302	2-96 65	3-49 45	2-43 115	0-96 60	0-23 13	1-15 52	0-50 16	5-83 202	3-06 109	36-03 110
Kwale Agriculture } Total Dept. 94-39/01 } Per cent	4-86 405	0-90 117	1-01 46	2-94 48	8-85 94	4-27 114	0-69 22	0-52 23	1-15 44	0-40 11	3-38 92	1-39 45	30-36 73
Mombasa Msese Headworks } Total 94-39/08 } Per cent	3-36 369	0-49 62	1-88 90	4-41 65	8-71 86	4-95 124	1-43 50	1-16 41	1-56 57	1-94 46	1-82 58	1-46 50	33-17 76
Mombasa Meteorological Station 94-3921 } Total Per cent	4-35 458	1-33 225	2-34 149	4-15 66	5-94 53	3-04 160	1-03 39	0-40 15	1-58 45	2-20 54	3-19 131	1-87 58	31-42 77

Food Production in African Areas

In Nyanza Province the surplus of cereal crops likely to be available for sale will be only about half the quantity of the previous year. This decrease is mainly due to adverse weather conditions and emphasizes the fact that in a year of poor harvests only approximately 22 per cent of the maize crop is surplus. With an increase in population of 45,000 families the present surplus would be absorbed. There was a slight increase in the surplus of groundnut and simsim.

The maize crop in the Rift Valley Province is an average one. In East Nandi the crop suffered damage from some severe hail-storms during the growing period which reduced the yield per acre to four or five bags. The total acreage of maize in the Province is estimated to be 110,000 acres and the exportable surplus 50,000 bags. Production from the estimated 17,000 acres of sorghum and finger millet is consumed locally in the Nandi, Baringo and West Suk Districts. The wheat crop largely grown in Elgeyo District is an average one of four to five bags per acre from approximately 2,000 acres.

In Central Province maize crops were on the whole good, a record harvest being reaped in Meru District, an average one in Nyeri District and an above-average crop in Fort Hall. Acreages of maize throughout the Province are not up to those of pre-Emergency days, however, owing to the concentration of the population in villages and total production remained below average. Increased surpluses of maize, beans, bulrush millet and pigeon peas were marketed during the year as compared with 1955. The surplus of cowpeas, Dolichos beans and grams was, however, reduced in 1956.

In the Southern Province bumper yields of cereals were taken from the 1955/56 short rains throughout Ukambani. At one stage it was estimated that there might be a surplus in Machakos District of some 60,000 bags of maize, but the failure of the long rains made it necessary to keep this surplus within the district. With this surplus available it has been unnecessary in spite of the general failure of long rains crops to import any appreciable amount of food into Machakos District. Food crops planted in the short rains are promising.

Maize remains the most popular food crop in the Coast Province and with cassava and cowpeas forms the basis of the local diet. This is supplemented with dried fish, coco-nuts, fruit, vegetables and a comparatively high consumption of animal protein. Combine this with the absorption of fairly considerable quantities of palm toddy and the African is provided with a more balanced diet than is often the case elsewhere. An indication of the food position in the Province is the availability of local labour for work on estates. For the first half of the year only a trickle of labour was available, but later on there was a plentiful supply. Good floods in May and December have provided and will provide plentiful food supplies in Tana River District. Long rains maize crops in Malindi and Kilifi were adequate. In the Teita District food crops were good, but partially failed in Kwale District. The short rains crops are in general poor.

Agricultural Exports, 1956

The total value of agricultural exports increased from £22,696,097 in 1955 to £25,412,490 in 1956. This increase was mainly due to increased export of coffee.

Exports of the following nine commodities exceeded £500,000.

				Position in	1955	1956
				1955	£	£
1. Coffee	..	..	..	(1)	8,926,908	13,652,604
2. Tea	..	..	..	(2)	2,761,151	2,615,677
3. Sisal	..	..	..	(4)	1,958,631	2,075,303
4. Wattle Extract	..	..	..	(3)	2,260,853	1,501,332
5. Pyrethrum (incl. Extract)	..	..	..	(6)	1,238,478	1,200,580
6. Cotton	..	..	..	(7)	691,649	852,474
7. Butter	..	..	..	(10)	513,575	615,705
8. Cattle Hides	..	..	..	(9)	586,704	607,616
9. Sheep and Goat Skins	..	..	..	(8)	670,116	518,337

The following table shows certain other agricultural exports:—

				Position in	1955	1956
				1955	£	£
10. Wool	..	..	..	(12)	256,908	279,616
11. Castor Seed	..	..	..	(13)	195,653	206,686
12. Wattle Bark	..	..	..	(11)	265,412	193,438
13. Cashew Nuts	..	..	..	—	49,045	144,126
14. Millet	..	..	..	—	27,700	142,353

Table B gives fuller details of domestic exports from Kenya in 1956, while Table C gives comparatively domestic quantities and values of exports of Kenya produce for the years 1939 and 1953-56 inclusive.

TABLE B.—DOMESTIC EXPORTS, KENYA—1956

(Figures provided by the Commissioner of Customs and Excise)

ARTICLES	Unit of Quantity	Quantity	Value
			£
LIVING ANIMALS, CHIEFLY FOR FOOD			
Bovine cattle, including buffaloes	Number	831	25,313
Sheep and lambs	"	30	179
Swine	"	5	163
Poultry	"	1,000	105
Goats and kids	"	21	45
Other, n.e.s.	"	—	—
MEAT AND MEAT PREPARATIONS			
<i>Meat: Fresh, Chilled or Frozen—</i>			
Meat of bovine cattle (beef, veal)	100 lb.	11,308	84,737
Meat of sheep or lambs (mutton, lamb) ..	"	491	4,515
Meat of swine (pork)	"	691	8,836
Poultry, killed or dressed	"	302	3,814
Meat of goats and kids	"	260	1,509
Other (including edible offals, horsemeat and game)	"	768	8,199

TABLE B.—DOMESTIC EXPORTS, KENYA—1956

(Figures provided by the Commissioner of Customs and Excise)

ARTICLES	Unit of Quantity	Quantity	Value
			£
MEAT AND MEAT PREPARATIONS—(Contd.)			
<i>Meat: Salted, Dried, Smoked or Cooked not Tinned—</i>	Centals of 100 lb.		
Bacon, ham and salted pork	100 lb.	4,025	56,770
Smoked, dried or salted beef and veal ..	„	—	—
Smoked, dried or salted meats	„	45	890
<i>Meat Tinned and Meat Preparations, Tinned and not Tinned—</i>			
Sausages of all kinds not in airtight containers	„	272	3,759
Meat and meat preparations in airtight containers	„	92	1,291
Meat extracts and preparations of meat (including natural sausage casings), n.e.s. ..	„	25	321
DAIRY PRODUCTS, EGGS AND HONEY			
Milk and cream, fresh (including buttermilk, skim milk, sour milk, sour cream and whey)	Imp. Gal.	7,199	1,456
Milk sweetened or unsweetened, separated or skimmed	Centals of 100 lb.	27	183
Cream	„	18	275
Milk and cream, other (in blocks and powder form)	„	41	445
Butter in airtight containers or not	„	42,421	615,705
Butter, clarified—Ghee	„	330	4,697
Cheese and curd	„	1,306	16,994
Eggs in the shell	Number	674,641	11,763
	Centals of 100 lb.		
Natural honey	100 lb.	—	—
Other Dairy Products, n.e.s.	—	—	414
CEREALS AND CEREAL PREPARATIONS			
	Centals of 100 lb.		
Wheat and spelt (including meslin) unmilled ..	100 lb.	—	—
Rice not in the husk, including polished and broken rice	„	459	1,717
Barley, unmilled	„	1	1
Maize (corn) unmilled (Indian Corn)	„	94,871	89,403
Oats, unmilled	„	2	3
Meal and flour of wheat and spelt (including meslin)	„	2,002	4,770
Millet, unmilled	„	95,160	142,353
Meal and flour of rye	„	2	3
Meal and flour of maize (corn)	„	537	817
Meal and flour of cereals, n.e.s.	„	6	47

TABLE B.—DOMESTIC EXPORTS, KENYA, 1956—(Contd.)

(Figures provided by the Commissioner of Customs and Excise)

ARTICLES	Unit of Quantity	Quantity	Value
			£
FRUITS AND VEGETABLES			
Edible nuts (including fresh coconuts) other than nuts chiefly used for the extracting of oil:—			
(a) Coconuts	Centals of 100 lb.	694	643
(b) Cashew nuts		42,365	144,162
Vegetables, fresh and dry, roots and tubers, not including artificially dehydrated:—			
Potatoes, not including sweet potatoes ..	"	20,295	18,823
Beans, peas, lentils and other legumes (pulses) dry, including split	"	6,701	18,677
Onions	"	8	28
Garlic	"	—	—
Other vegetables chiefly for human food ..	—	—	18,942
Other vegetables preserved or prepared in air-tight containers	Centals of 100 lb.	8,275	34,061
Flour and flakes of potatoes, fruits and vegetables (including sago, tapioca and all other starches prepared for use as food) ..	"	79	292
SUGAR AND SUGAR PREPARATIONS			
Jaggery (Muscovado)	"	42	68
Sugar, not refined	"	349	993
COFFEE, TEA, COCOA, SPICES AND MANUFACTURES THEREOF			
Coffee, not roasted	"	597,499	13,652,644
Coffee, roasted	"	821	21,924
Tea	"	155,821	2,615,677
HIDES, SKINS AND FUR SKINS, UNDRESSED			
<i>Hides and skins (except Fur Skins), undressed—</i>			
Hides of cattle, undressed:—			
(a) Ground dried	"	627	3,945
(b) Suspension dried	"	50,423	490,037
(c) Wet salted hides	"	23,948	112,124
(d) Pickled	"	6	102
<i>Calf skins and kid skins, undressed—</i>			
(b) Suspension dried	"	66	1,408
(c) Wet salted	"	—	—
<i>Sheep skins and lamb skins (except astrakhan, caracul, persian lamb, broadtail), undressed—</i>			
(a) Ground dried	"	140	1,178
(b) Suspension dried	"	12,395	163,389
(c) Pickled	"	12	212
<i>Goatskins and kidskins, undressed—</i>			
(a) Ground dried	"	249	2,932
(b) Suspension dried	"	14,782	350,626
Crocodile skins	"	539	39,144
Other hides and skins, n.e.s.	"	26	405
Leopard skins, undressed	"	—	30
Other fur skins, undressed	"	—	—

TABLE B.—DOMESTIC EXPORTS, KENYA, 1956—(Contd.)

(Figures provided by the Commissioner of Customs and Excise)

ARTICLES	Unit of Quantity	Quantity	Value
			£
SHEEP AND LAMBS' WOOL			
Greasy or back-washed	Centals of	10,691	166,479
Scoured	100 lb.	5,975	113,137
OIL SEEDS, OIL NUTS AND OIL KERNELS			
Groundnuts (peanuts) green, whether shelled or unshelled	"	39,425	107,755
Copra	"	1,120	2,925
Soya beans	"	—	—
Linseed (flax seed)	"	—	—
Cottonseed	"	41,957	50,683
Castor seed	"	77,350	206,686
Sesame seed	"	8,548	27,263
Sunflower seed	"	28,504	46,016
Other oil seeds, nuts and kernels	"	1,290	1,816
Raw cotton	"	69,045	852,474
Flax and flax tow and waste	"	—	—
Ramie and ramie tow and waste	"	—	—
Sisal	"	788,605	2,075,303
Mangrove bark	"	3,135	3,487
Wattle bark	"	132,418	193,438
Pyrethrum	"	29,342	390,183
Papain	"	3	236
Kapok	"	529	4,475
Pyrethrum Extract	"	2,295	810,397
ANIMAL OILS AND FATS			
Oils from fish and marine animals	"	1	7
Animal oils, fats and greases, excluding lard	"	814	5,233
VEGETABLE OILS			
Cottonseed	"	135	788
Groundnut (peanut) oil	"	353	1,835
Coconut (copra) oil	"	2,226	9,821
Sesame seed oil	"	100	565
Other vegetable oils	"	110	829
Beeswax	"	1,030	25,123
Hydrogenated oils and fats	"	52	515
Wattle bark extract	"	488,609	1,501,332
ESSENTIAL VEGETABLE OILS			
Lemon grass oil	Lb.	—	—
Bitter orange oil	"	—	—
Cassia oil	"	4,580	12,000
Sandalwood oil	"	65,062	11,592
.. .. .	"	12,208	6,139
TOTAL			£ 25,412,490

Crops

Barley.—The production of barley from the 1955 crop was 157,307 bags (180 lb.) from 23,777 acres, an average yield of 6.62 bags per acre. The estimate of production from the 1956 crop is 306,967 bags from 42,456 acres, an average yield of 7.23 bags per acre. The acreage of this crop is gaining ground at the expense of the wheat crop, it being resistant to the main diseases of wheat. There is also an increasing demand for the crop for malting and for pig feed. Results in the Trans Nzoia have, however, been disappointing this season.

Cashew Nuts.—A record crop was harvested in the Coast Province as follows:—

									<i>lb. raw nuts</i>
Kilifi	..	..	..	..	..	..	..	..	1,823,095
Malindi	..	..	..	..	..	..	..	..	2,015,880
Kwale	..	..	..	..	..	..	..	..	1,234,520
Tana River and Lamu	..	..	..	..	..	..	..	..	66,600
Mombasa	..	..	..	..	..	..	..	..	9,940
Total									5,150,035
									or 2,300 tons

The cashew nut factory at Kilifi had a substantial balance of unprocessed nuts at the beginning of the year left over from the previous season and this, combined with a record crop, and an acute labour shortage, made it necessary for the firm to be granted permission to export 1,500 tons.

The crop was purchased from the producer at a fixed price of 20 cents a lb. This represents a cash return of £50,834. Growing criticism of monopoly arrangements whereby producers were obliged to sell their nuts to the Kilifi factory at a fixed producer price and the fact that this price has been at times substantially lower than that of our neighbour Tanganyika made it necessary to change the policy for the 1956/57 season, four firms being granted licences to export. At the end of the year the initial crop had been purchased at 33 cents a lb.

Cassava.—This remains a popular food and famine reserve crop in the lower areas of Nyanza Province and the acreage increased in all districts except Kericho. Mosaic is widespread and the distribution of resistant varieties continues. The Nyanza price was increased to Sh. 12/50 a bag of 125 lb. towards the end of the year with a view to ensuring production to fulfil a contract with the Pig Board to supply 10,000 bags. There is a growing demand for cassava for pig rations. In the Southern Province much of the crop has been consumed in the drought and needs to be bulked up again. The crop is common throughout the Coast Province but is mainly produced in the Kwale District. It commands a ready sale raw in Mombasa and the main exporting district inspected 1,732 bags. Considerable quantities also find their way into Mombasa from the North Coast and an approximate estimate of the amount marketed would be 250 tons at 5 cents a lb. to the producer.

Castor Seed.—This crop is planted extensively in the Southern Province on contour banks and is one of the few crops which thrive in the hotter, low rain-fall areas. Price fluctuations tend to limit interest in this crop by African growers, nevertheless 18,689 bags valued at £86,373 were exported from the Southern Province in 1956 compared with 41,465 bags valued at £111,971 in 1955. Production in the Coast Province in 1955 amounted to 964 tons valued at £43,425.

Chillies.—The main production is from lower Teita District where the cash income is used to buy food to supplement the generally meagre maize crops. Chillies are also produced in small quantities in Kwale and elsewhere along the Coast. Production in the Teita area increased from 225 tons valued at £12,500 in 1955 to 236 tons valued at £19,150 in 1956. The price varied from 50 cents per lb. early in the season to Sh. 1/40 per lb. or Sh. 50 per frasila of 36 lb. at the end of the season. The percentage of Teita chillies sold through co-operative societies has risen from 8 per cent in 1954, 10 per cent in 1955 to 25 per cent in 1956. Chillies sold through such societies are destalked and command a better price. Production figures from coastal districts are incomplete, but Kwale District produced 180 tons of dry chillies valued at £7,650 and green chillies to the value of £140.

Coffee.—The area planted to coffee by European growers is approximately 59,883 acres. Total production increased enormously from 12,335 tons in 1955 to 23,919 tons in 1956. The average yield per acre rose from 4.1 cwt. to 7.9 cwt. The estimate for the 1956 crop is approximately 18,000 tons. Coffee again retained its place as Kenya's most valuable export crop and the mean export value per ton for all grades increased from £379 in 1955 to £509 in 1956. The quantity of the coffee exported increased from 19,423 tons valued at £8,926,908 in 1955 to 26,774 tons valued at £13,652,644 in 1956.

The expansion in coffee growing by Africans was a feature of the year and the acreage increased from 7,521 acres in 1955 to 12,052 acres in 1956. There are now 32,151 licensed growers in the Central Province, 15,808 of whom are in Meru District and 8,058 in Embu District, 3,707 in Nyeri District, 3,060 in Fort Hall and 1,518 in Kiambu. Seedlings are ready for an additional planting of 3,800 acres in 1957 in the Central Province. The quality of coffee from this Province remained high and the cup presented by the Coffee Board of Kenya for the best African coffee was won for the second year in succession by the Ngandori Co-operative Society of Embu District. Cultural standards have improved during the year and the production of adequate quantities of grass suitable for mulching is being insisted upon. An outbreak of Coffee Berry Disease in the latter months of the year affected a quarter of the crop in Nyeri District.

The coffee crop in Nyanza grown by Africans amounts to 2,850 acres. The quality of the 1955/56 crop was better than had been expected, climatic conditions being responsible for a soft type of bean. The classification was:—

South Nyanza	41.42 per cent in first three classes
Elgon Nyanza	54.64 per cent in first three classes

In the Kericho District there is little demand from the Kipsigis to plant coffee; only 51 farmers bought seedlings during the year. The demand for seedlings also declined in North Nyanza only 44 acres being planted. The hard work involved in land preparation is thought to be the deterrent. South Nyanza experienced a heavy infestation of *antestia* which was controlled by dusting.

The area under coffee in the Teita Hills now amounts to 186 acres and the Teita Coffee Growers' Co-operative Society showed a net profit of Sh. 7,000 in 1956. This sum was put aside for improvements to the factory and for the building of a second factory.

The acreage under coffee in Machakos District now amounts to 178 acres. The trees weathered the severe drought in the district extremely well.

Coco-nuts.—Coco-nut acreages in the Coast Province are as follows:—

	<i>Acres</i>							
Kilifi District	..	..	..	..	..	..	..	25,500
Kwale District	..	..	..	..	..	..	..	19,720
Malindi	..	..	..	..	..	..	..	1,700
Total								46,920

Yields vary from an average of 21 nuts per palm on a well-tended plantation to 11 nuts average for the Kilifi District. This last average is low, but a high proportion of the trees are unproductive of nuts as they are used for tapping. It is estimated that from Kilifi District 500,000 gallons of toddy are exported at Sh. 1/50 per gallon resulting in a value to producers of £37,000. Coco-nuts were exported in large quantities from the Kwale and Kilifi Districts to Mombasa and comparatively little copra was made. Kwale District produced 422 tons of copra valued at £23,632. Plantation hygiene has improved immensely as a result of the Coco-nut Improvement Scheme. Experience in 1956 has revealed that whereas in Kwale District the problem is one of gapping-up and extension in Kilifi it might almost be said that the reverse applies because of unduly close espacement of palms and in some localities it is a reduction and not an increase of the palm population that is required to effect improvement. The price of nuts varied during the year from Sh. 20 to Sh. 22 per 100 nuts as against Sh. 17 to Sh. 18 per frasila of copra. One hundred raw nuts yield one frasila of copra. Total production of copra amounted to 1,125 tons valued at £56,000.

Cotton.—The final production figures for the 1955 planted crop which was ginned in 1956 were:—

					<i>Bales of lint of 400 lb.</i>		
					<i>A.R.</i>	<i>B.R.</i>	<i>Total</i>
Nyanza Province	..	..	..	..	10,399	1,540	11,939
Coast Province	..	..	..	..	3,353	1,005	4,358
Kenya total					13,752	2,545	16,297

In Nyanza the area harvested was 76,000 acres as compared with 72,500 acres in the previous year. The 1956/57 crop is expected to be slightly better. The prices paid to growers for the 1955/56 crop were 54 cents for A Grade and 20 cents for B Grade. This is a drop of 6 cents and 3 cents per lb. respectively compared with the previous season. All districts in Nyanza again held early planting campaigns which were moderately successful in South Nyanza and on the Kano plains but not very effective elsewhere. The organization of a spraying service to control insect pests is now under consideration.

In the Coast Province the acreage declined to 25,000 acres. The price paid was 50 cents per lb. for A Grade and 20 cents per lb. for B Grade. The 1956/57 crop is expected to be much reduced and only 1,000 bales are anticipated largely due to the unfortunate practice of interplanting with maize.

The Nyanza crop was marketed through the Uganda Lint Marketing Board and the Coast crop was sold by tender. Exports of raw cotton increased from 52,249 centals valued at £691,649 in 1955 to 69,045 centals valued at £852,474 in 1956.

Essential Oils.—Geranium oil producers in the Lumbwa area had a disappointing year due to lack of labour for weeding and prolonged wet weather, production amounting to 4,045 lb. The average price to the grower was Sh. 86 per lb. Exports of geranium oil decreased from 53 cwt. valued at £14,990 in 1955 to 41 cwt. valued at £12,000 in 1956.

Flax.—Exports of this crop decreased from nine tons valued at £1,296 in 1955 to nil in 1956.

Groundnuts.—A total of 31,697 bags of 180 lb. was bought by the Nyanza Province Marketing Board of which 22,967 bags came from South Nyanza. The price to growers was raised Sh. 10 at the end of the year to Sh. 82 per bag. A campaign to encourage early lifting was successful the object being to avoid deterioration of the crop in the ground. The cash return for the 1956 crop was valued at £108,440 compared with £78,939 in 1955.

Kapok.—This crop is on the increase in most Coastal areas. Production figures for 1956 are:—

Malindi	..	..	..	..	..	30 tons valued at £1,350
Kwale	..	..	..	..	..	16 tons valued at £ 720
Estate production	..	..	..	..	..	80 tons in seed Kapok valued at £3,600
						Total £5,670

Linseed.—Actual production from the 1955 crop was 1,046 bags (200 lb.) from 805 acres the average yield being 1.30 bags per acre. This remains a very small crop but a little interest is now being shown in it particularly where "Take-all" disease of wheat has become serious.

Maize.—Actual production from the 1955 crop in the non-native areas was 1,205,870 bags (200 lb.) from 157,870 acres an average yield of 7.64 bags per acre. The estimate of production from the 1956 crop is 1,270,349 bags from 166,285 acres giving an average yield of 7.64 bags per acre. There has been a small increase in the overall maize acreage, white maize having increased by 3,500 acres and yellow maize declined by 2,380 acres. An outbreak of army worm in the maize areas of the Rift Valley Province was largely controlled by spraying in the early part of the year. Labour shortage is becoming a problem with this crop which is being met by a change-over to wide spacing and the use of disc harrows between the rows thus increasing the exposure of the soil to erosion.

Deliveries to the Maize Control during the past two crop years ending 31st July were:—

						<i>Bags of 200 lb. net</i>	
						<i>1954/55</i>	<i>1955/56</i>
Non-African areas	..	..	..	..	..	1,000,326	1,080,556
African areas	..	..	..	..	..	1,299,345	651,054
						Total 2,299,571	1,731,610

Of the 651,054 bags of African-grown maize 514,970 bags were produced in Nyanza Province. It is estimated that the surplus crop available from the Nyanza 1956 planted crop will again be in the region of 500,000 bags. The crop has been reduced by severe hail-storms in North and Elgon Nyanza.

The guaranteed f.o.r price for Grade II maize from the 1956 crop was Sh. 39/98 per 200 lb. bag without the bag.

Oats.—The actual production of oats from the 1955 planted crop was 129,141 bags (150 lb.) from 19,206 acres an average yield of 6.72 bags per acre. The estimate of production from the 1956 planted crop is 199,332 bags from 25,385 acres. This crop has become very popular in the Highlands mainly as a silage and hay crop, but is also in the higher country used as a ley.

Other Cereals.—Sorghum, Finger Millet, Bulrush and Foxtail Millets are mainly subsistence crops in the African areas. In the crop year ending 31st July, 1956, 41,830 bags of these cereals were sold to Produce Control, most of it being Finger Millet.

Passion Fruit.—The acreage of this crop in the Sotik area has remained static. "Brown Spot" disease and "Woodiness" continued to cause considerable damage to the crop. Interest is being shown in the crop elsewhere in Kericho District, but little planting has yet taken place. Total production for 1956 amounted to 127,459 lb. and the number of growers was six. Increased plantings are being planned in Northern Nyanza Province in 1957.

Potatoes.—Production in the Central Province increased from 55,802 bags valued at £81,370 in 1955 to 66,666 bags valued at £82,004 in 1956. The 1956 crop from Kericho District was 6,984 bags valued at £10,476. There is still only a small acreage under the crop in the European-farmed areas but the total acreage figure has risen from 900 in 1954 to 1,500 in 1955. Exports increased from 800 tons valued at £17,302 in 1955 to 906 tons valued at £18,923 in 1956.

Sweet Potatoes are extensively grown as a subsistence crop in Central Province and there have been increased plantings in Fort Hall and Nyeri where they are also becoming popular as a food-stuff for pigs and other livestock. The crop is also important in the Teita country where it is used as an adjunct to maize as a food crop. In Malindi the crop is grown for cash, being sold on the Mombasa market.

Pulses.—Deliveries to Produce Control in the crop year ending 31st July were:—

	1954/55	1955/56
	<i>Tons</i>	<i>Tons</i>
Beans, various	3,284	3,708
Field peas	30	115
Cowpeas, grams and others	2,422	985
Total	5,736	4,808

In Nyanza Province the surplus of pulses increased by 25 per cent, the bulk coming from South Nyanza, but yields were generally low. Recorded sales amounted to £10,300. In Central Province recorded sales amounted to £79,035. In the other Provinces recorded sales were negligible.

Exports of pulses decreased from 645 tons valued at £36,784 in 1955 to 299 tons valued at £18,677 in 1956.

Pyrethrum.—The area licensed for 1956 was 26,043 acres, a considerable increase on last year. Production of dried flowers increased from 2,679 tons in 1955 to 3,142 tons in 1956. The number of licensed growers for the year 1956 was 739.

The acreages grown by Africans in the Central Province are shown below:—

	1955	1956
	<i>Acres</i>	<i>Acres</i>
Meru	—	10.00
Embu	2.50	45.00
South Nyeri	305.28	355.28
Fort Hall	35.00	85.00
Kiambu	1,367.69	1,510.00
Total	1,710.47	2,005.28

Cultural standards, particularly in Kiambu, are quite good, this being reflected in results at the Royal Show, Nairobi, in October, when that district obtained second and third places in the pyrethrum class. The value of the Central Province crop increased from £49,985 in 1955 to £72,446 in 1956. The value of the African-grown crop also increased in Nyanza Province where 28½ tons were produced, realizing £4,800 as compared with 10½ tons realizing £1,775 in the previous year. This crop has become very popular in South Nyanza but not elsewhere in the Province where conditions are suitable such as Elgon Nyanza. Some 56 acres are also under the crop in the higher areas of Elgeyo and West Suk.

In the European areas yields have been good and the crop remains one of the most attractive of cash crops.

Rice.—In Nyanza Province the policy of encouraging selected pure varieties by a price differential continued. Of the total of 26,616 bags of paddy bought by the Marketing Board during the year 80 per cent were pure. The value of the crop declined from £135,432 to £37,025, 84,186 bags having been marketed the previous year. The overall acreage declined during the year, this being due, in Elgon Nyanza to a shortage of pure seed and in the Central Nyanza to idleness on the growers' part.

In the Tana River area of the Coast Province the acreage under rice is decreasing, but the crop was produced under ideal conditions. In Vanga yields were good from the 700-acre irrigated area. Deliveries to Produce Control amounted to 41,172 bags of 160 lb. of paddy.

Sisal.—Production increased from 37,950 tons in 1955 to 39,637 tons in 1956. Labour employed by the Sisal estates at the end of the year was estimated to be 21,878 men, women and juveniles. Census figures record the acreage under sisal as 188,400 in 1955 as compared with 189,800 in 1954.

The Machakos African Sisal Scheme produced 826 tons of fibre for export worth £23,128 as compared with 258 tons worth £5,846 in the previous year. Production was stepped up to 100 tons per month prior to the onset of the short rains, but a drop in world prices had to be passed on to the producer which resulted in decreased production.

Sugar.—The production of white sugar by Miwani Sugar Mills increased from 12,006 tons in 1955 to 16,465 tons in 1956. The Miwani Sugar Factory crushed 170,967 tons of cane of which 43,942 tons came from individual growers. The current price of cane delivered to the factory is Sh. 36/07 per ton. No firm figure can be given for cane used for jaggery manufacture, but it is estimated that 25,000 tons were used for this purpose. In South Nyanza an outlet for some 260 acres of cane ready for harvesting had to be found and a jaggery factory

financed by the African District Council was erected at the end of the year. In North Nyanza an Asian company erected a jaggery factory near Mumias, purchasing cane from African growers at Sh 30 a ton. Some 17 tons of jaggery was manufactured. The same company now plans a second factory in the Butere area. In the Kabras area growers have been formed into a co-operative society and are seeking loan funds to construct a factory. Meanwhile the North Nyanza Mobile Factory continues to deal with cane from scattered plots. During the year a centrifuge was fitted to the Mobile Unit for the experimental production of brown sugar. The future market for jaggery is uncertain necessitating caution in expanding production.

In the Coast Province irrigation of 200 acres of young cane at Ramisi was successfully accomplished. As a result of experiments conducted by the Department this estate is now using fertilizers to boost production. Production by the Ramisi factory amounted to 3,400 tons in 1956. Total Kenya production was 19,865 tons.

Sunflower.—Actual production from the 1955 crop was 44,353 bags (100 lb.) from 11,166 acres an average yield of 3.97 bags per acre. Of this production 13,555 bags were retained on farms. The estimate for the current 1956 planted crop is 56,808 bags from 12,645 acres. This crop is mainly grown in the Trans Nzoia and, to a lesser extent, Uasin Gishu and Nakuru Districts. Produce Control recorded deliveries of 610 bags from African growers in Nyanza and the Central Province.

Tea.—In Nyanza Province the acreage under tea is steadily increasing. New estates in the Nandi and Upper Songhor areas have so far only planted-up nurseries. The crop, helped by good rainfall, has been good and production will again show an increase. Estimated acreages planted in 1956 are:—

Kericho	..	..	..	1,600 acres
Nandi Hills	..	..	..	500 acres
Sotik	..	..	..	200 acres

Estimated production is:—

Kericho	..	..	..	17,994,450 lb.
Nandi Hills	..	..	..	1,345,524 lb.
Sotik	..	..	..	643,190 lb.

Total Kenya production of tea is estimated to be nearly 22,000,000 lb. for 1956. The first East African tea auction was held in Nairobi during the year, 149 chests offered by Kenya estates being sold.

The Central Province scheme for tea-growing by Africans continued to develop throughout the year. It is guided by a Board consisting of advisory members from the Kenya European tea industry, Government officials and grower representatives. The Board directs policy and controls the finances of the scheme. A tea officer of the Department, who is also secretary to the Board, supervises factory construction and, guides nursery and crop management. There are three separate growing areas—Othaya and Mathira in Nyeri District and an area in Embu District close to the Nyeri border. The tea is mostly grown on individual holdings. The total acreage is now 36,560 acres. During the year factory buildings have been erected at Kagochi in the Mathira area. At the end of the year machinery to deal with a throughput of 500,000 lb. of made tea per year was on the site, a power line was nearing completion and a start on production was planned for April, 1957.

The year 1957 will also see the establishment of the first plantings of African-owned tea in Kericho District.

Tobacco.—The production of flue-cured Virginia tobacco continued under the aegis of the East African Tobacco Company in the Fort Hall, Embu and Kitui Districts. At Kitui the short rains crop yielded well, but the long rains crop was a complete failure. The Central Province crop amounted to 1,334,613 lb. green leaf from the two crops grown. The price to the grower varied from 7.95 cents per lb. to 8.5 cents per lb. and the yield per acre ranged from 334 lb. to 782 lb. of cured leaf. The total cured crop from Central Province weighed 268,280 lb. and about 900 growers shared the total cash income of £8,298. In Embu District registration of growers in the Ena area has taken place with the object of restricting planting to land which has been under continuous cultivation for less than three years. By this means and with greater attention to cultural practices it is hoped to increase the return to individual growers.

Snuff tobacco is still grown in certain localities throughout the Central Province and is a profitable crop. In Meru District half the export was handled by co-operative societies and brought in a return of over £5,000. It is also produced in Machakos and Kitui Districts of the Southern Province and is a valuable sideline.

Vegetables, Fruit and Flowers.—There was virtually no expansion of pineapple acreages in Kiambu District of the Central Province and the increase in Fort Hall District was less than anticipated. This is due to the reorganization of holdings which is taking place in these districts and the consequent uncertainty as to where an individual's final holding is likely to be. Standards of cultivation in Kiambu are poor and provide a fertile field for improvement once the consolidation of holdings has been accomplished. In Embu District a small acreage has been established on the Embu Settlement Scheme where high-quality fruit can be produced. Production of pineapples in the Central Province increased from 5,050 tons in 1955 to 7,580 tons in 1956 and the value rose from £48,000 to £58,625. The acreage under cultivation by European-owned estates in the Nairobi and Thika Districts continues to expand and it is estimated that an additional 600 acres was established in 1956, much of it on *vlei* land developed into cambered beds for drainage purposes.

The total sales of vegetables, fruit and flowers were worth £243,841 in 1956 in addition to the £58,625 obtained from pineapples and represented a handsome income for Central Province producers. Fruit and vegetables taken together were worth £143,760 to Kiambu District, indicating the importance of these crops to that district. Fort Hall District sold 65 tons of plums largely to the canners and registered an increasing export of bananas, fruit and vegetables to the value of £79,794. The banana crop in the Central Province was valued at £43,751 in 1956 and amounted to 849 tons. Another good revenue earner for the Province was miraa (*Catha edulis*), bundles of chewing sticks, to the value of £52,586 being exported.

Production from the Southern Province again increased during the year and recorded sales of vegetables and fruits rose from £59,977 in 1955 to £65,540 in 1956. The value of the onion crop was £14,428 compared with £5,001 in the previous year. The strawberry crop was worth £2,485 and green beans for canning £4,757. The production of tomatoes for *purée* was attempted during the year in Machakos District, 25 acres being planted on irrigated land, but the quality of the fruit was not good and the income only £224.

The Teita Hills area of the Coast Province continued to supply Mombasa with vegetables. Eight hundred and fifty tons were exported from the district in 1956, valued at £23,000. The slight reduction in production compared with 1955 was due to the failure of the usual July/August mists. Attempts are being made

to diversify production and reduce the proportion of "ratooned" cabbage in the output. The citrus crop in Kilifi District realized £1,750 and the banana crop £12,750.

In Nyanza Province the onion crop declined to 1,453 bags worth £3,242 in 1956. Excellent quality pineapples suitable for the overseas fresh market have been harvested from the plantings reported last year. Bananas are becoming increasingly important in most districts and in North Nyanza exports were valued at £25,000.

Wattle.—Owing to the cutting out of plantations in the Central Province during the Emergency, production of bark decreased from 47,951 tons valued at £560,000 in 1955 to 37,941 tons valued at £480,185 in 1956. This decline is likely to continue.

Sales of dry bark from the other African areas amounted to 1,926½ tons, made up as follows:—

				Tons
Nyanza Province	..	..	..	239
Rift Valley Province	..	..	..	440
Southern Province	..	..	..	874½
Coast Province	..	..	..	373

The area under wattle on European-owned farms and estates was estimated to be 79,200 acres during the year, most of this being in the Uasin Gishu District.

The following statistics were supplied by the Kenya Wattle Manufacturers' Association:—

	1955	1956
	Tons	Tons
Purchased from Africans:		
Dry Bark, F.A.Q.	38,468 ..	29,592
Dry Bark, U.G.	3,794 ..	5,287
Green Bark, F.A.Q.	4,598 ..	2,339
Purchased from Europeans:		
Dry Bark, F.A.Q.	8,499 ..	5,538
Dry Bark, U.G.	149 ..	58
Green Bark, F.A.Q.	11,561 ..	18,220
Total production of extract	30,375 ..	25,512
Total export and local sales of extract	33,561 ..	22,277½
Exportable value (approx.)	£2,282,000	£1,353,781

The Konza factory processed bark to the value of £49,911.

Actual exports of wattle extract decreased from 33,223 tons valued at £2,260,853 in 1955 to 21,812 tons valued at £15,013,332 in 1956.

Wheat.—Actual production from the 1955 planted crop amounted to 1,354,364 bags (200 lb.) from 344,861 acres an average yield of 3.93 bags per acre. One hundred and ten thousand eight hundred and forty-two bags of this crop were retained on farms. The acreage of the 1956 planted crop is down by approximately 30,000 acres, but the average yield is expected to be rather more than four bags an acre, giving an estimated crop of 1,250,000 bags. The price of many years of continuous cropping is now being paid by wheat growers in low yields and a high incidence of diseases. The guaranteed f.o.r price for Grade I wheat from the 1956 sown crop was Sh. 52/66 per 200 lb. naked.

Livestock Products

Bacon and Lard.—Production is showing signs of increasing according to the following figures of deliveries of pigs to the factories:—

	<i>Last 6 months of 1955</i>			<i>First 6 months of 1956</i>		
Baconers	..	..	15,010	..	..	16,179
Porkers	..	..	6,436	..	..	7,151
Larders	..	..	1,838	..	..	2,327
Total			<u>23,284</u>			<u>25,657</u>

The number of licensed producers rose from 539 in 1955 to 620 in 1956. The quality of Kenya pigs has risen steadily in recent years.

Butter.—Creamery production increased from 9,902,210 lb. in 1955 to over 10,391,510 lb. in 1956. Exports during the year amounted to 3,353,854 lb. valued at £509,681. The average payout for Grade I butterfat was Sh. 3/21 per lb.

Cheese.—Production of cheese by the creameries amounted to 805,285 lb.

Eggs.—Sales of eggs from the African areas increased from 25,400 gross valued at £28,098 in 1955 to 35,139 gross valued at £42,796 in 1956.

Poultry.—Sales of poultry from the Central, Southern and Nyanza Provinces totalled 143,072 birds valued at £26,370 as compared with the 1955 figures of 210,123 birds valued at £44,027.

Hides and Skins.—Exports of hides and skins were valued at £1,125,953 in 1956.

Slaughter Stock.—The following are comparative figures of purchases by the Kenya Meat Commission:—

	<i>1955</i>	<i>1956</i>
European-owned cattle and calves ..	48,653	53,002
African cattle	42,877	34,446
European-owned sheep and goats ..	44,528	35,939
African-owned sheep and goats	101,641	128,591

Wool.—Exports of wool increased from 13,818 centals valued at £256,908 in 1955 to 16,666 centals valued at £279,616 in 1956.

TABLE C.—QUANTITIES AND VALUES OF EXPORTS OF KENYA PRODUCTS, 1956

COMMODITIES	Unit	QUANTITIES				VALUES					
		1939	1953	1954	1955	1956	1939	1953	1954	1955	1956
Cattle	Number	—	—	650	601	831	£	—	£	£	£
Sheep and Goats	"	—	—	304	167	51	—	—	33,493	25,740	25,313
Bacon and Ham	Cwt.	1,376	19,851	14,110	4,837	3,593	9,080	223,932	613	605	224
Beeswax	"	1,208	1,145	1,227	1,381	919	5,162	21,450	164,300	70,998	56,770
Butter and Ghee	"	21,277	12,584	25,764	30,405	38,170	90,659	239,495	25,985	32,766	25,123
Cheese	"	652	137	132	483	1,166	2,987	2,175	483,572	517,646	620,402
Hides (shade-dried)	"	19,245	55,780	48,208	45,505	45,020	53,372	798,325	2,355	6,070	16,994
Skins (sheep and goats shade-dried)	"	337,082	25,623	25,949	28,480	24,200	18,152	565,151	609,005	661,801	514,015
Hides (sun-dried)	"	21,737	2,954	1,828	1,723	559	43,444	29,170	16,847	12,070	3,945
Skins (sheep and goats sun-dried)	"	1,014,543	1,664	825	542	784	40,900	24,861	13,348	8,315	4,110
Other Hides and Skins	"	—	13,447	10,686	23,989	21,961	—	151,319	81,343	159,359	153,425
Wool	Centals of 100 lb.	15,114	14,543	12,281	13,818	16,666	56,578	257,100	214,530	256,908	279,616
CROP PRODUCTS—	Ton	215	1,880	52	645	80	1,561	151,580	1,193	34,865	3,568
Coco-nuts and Copra	Cwt.	338,125	295,795	216,126	388,468	534,214	800,827	6,712,733	5,726,824	8,926,908	13,674,568
Coffee	Centals of 100 lb.	59,677	42,231	61,002	52,249	69,045	124,021	511,972	796,041	691,649	852,474
Cotton	"	29,163	35,334	32,232	33,502	35,205	442,434	2,482,469	2,041,563	1,958,631	2,075,303
Sisal	Ton	16	87	22	9	—	810	13,333	3,341	1,296	—
Flax	"	123,002	42,991	12,873	12,891	5,983	40,250	73,804	38,174	36,784	18,677
Beans and Peas	Cwt.	1,007,125	215,043	918,332	1,543,033	84,706	222,037	306,017	1,013,192	1,665,422	89,403
Maize	"	122,029	34,419	5,602	12,553	479	23,450	48,367	8,182	17,107	817
Maize Meal and Flour	"	7,756	5,944	—	—	—	2,702	20,643	—	—	—
Pulses other than Beans	"	973	5	—	—	—	393	11	—	—	—
Wheat	"	63,883	223,364	103,169	15,270	1,787	50,655	573,545	269,096	40,697	4,770
Wheat Flour	"	—	—	—	—	—	—	—	—	—	—

TABLE C.—QUANTITIES AND VALUES OF EXPORTS OF KENYA PRODUCTS, 1956—(Contd.)

COMMODITIES	Unit	QUANTITIES					VALUES				
		1939	1953	1954	1955	1956	1939	1953	1954	1955	1956
Grain other than Maize and Wheat	Cwt.	14,618	180	29,994	18,162	84,484	4,424	533	18,388	29,317	144,074
Groundnuts	Ton	402	5	28	$\frac{1}{2}$	1,760	4,442	242	1,317	4,56	107,755
Cashew Nuts	"	32	71	925	1,094	1,891	1,812	21,143	21,437	49,045	144,162
Castor Seed	"	—	4,600	6,267	4,905	3,453	—	266,721	253,190	195,653	206,686
Sunflower Seed	"	477	1,496	2,570	1,221	1,272	3,997	65,283	88,925	54,288	46,016
Coco-nut Oil	Cwt.	33,152	43	23	693	1,987	2,346	298	177	3,461	9,821
Essential Oils	"	3,660	767	619	1,013	730	4,956	30,114	29,896	41,312	29,731
Groundnut Oils	"	6,233	—	226	—	315	680	—	1,582	—	1,835
Sesame Oil	"	89,944	—	136	280	89	10,008	—	872	1,946	565
Potatoes	"	173,046	21,011	13,735	16,000	18,120	29,199	18,200	14,410	17,302	18,823
Pyrethrum	"	55,628	26,301	23,129	18,553	26,180	357,170	395,852	334,272	284,732	390,183
Sugar	"	81,463	521	1,392	440	311	50,308	1,438	4,957	1,376	993
Tea	"	88,627	59,925	96,800	115,572	139,125	501,732	928,276	2,062,654	2,761,151	2,615,677
Wattle Bark	"	226,716	36,100	135,831	162,713	118,230	72,846	58,591	219,979	265,412	193,438
Wattle Bark Extract	"	131,312	441,828	484,085	664,465	436,258	91,439	1,544,720	1,668,037	2,260,853	1,501,332
Passion Fruit Juice	"	22,744	—	—	—	—	6,713	—	—	—	—
Pyrethrum Extract	"	—	—	1,483	2,443	2,049	—	—	570,775	953,746	810,397
OTHER AGRICULTURAL PRODUCE	"	—	—	—	—	—	54,446	178,796	323,628	193,414	281,448
TOTAL ..	..	—	—	—	—	—	3,242,495	16,718,264	17,823,241	22,696,097	25,412,490

TABLE D.—QUANTITIES AND VALUES OF MORE IMPORTANT PRODUCTS MARKETED FROM
THE AFRICAN AREAS (PARTLY ESTIMATED)

PRODUCE	Unit	NYANZA PROVINCE		CENTRAL PROVINCE		SOUTHERN PROVINCE		COAST PROVINCE	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Bananas ..	Ton	—	£	849	£	—	£	2,800	£
Beeswax ..	36 lb.	—	—	294	1,286	1,118	—	—	40,165
Cashew Nuts ..	lb.	—	—	—	—	—	7,665	—	—
Cassava ..	125 lb.	3,036	1,570	—	—	—	—	5,073,495	50,719
Chillies ..	Tons	—	—	—	—	—	—	—	878
Coffee (Parchment and Buni) ..	Tons	344	130,560	2,457	353,965	—	—	406	34,324
Copra ..	Tons	—	—	—	—	—	—	10	600
Coco-nuts ..	Number	—	—	—	—	—	—	422	23,632
Coriander ..	180 lb.	—	—	—	—	112	—	4,000,000	40,000
Castor Seed ..	180 lb.	—	—	309	550	18,689	378	—	—
Cotton Lint ..	lb.	—	—	—	—	—	86,373	11,568	43,425
Eggs ..	Number	15,927,551	397,500	—	—	—	—	5,720,084	121,890
Charcoal, Fuel, Poles ..	—	3,455,968	27,255	1,065,405	11,645	538,656	3,896	—	—
Ghee ..	36 lb.	—	—	—	312,576	—	—	—	—
Groundnuts ..	180 lb.	25,606	114,460	—	—	347	1,746	—	—
Hides ..	Number	31,061	108,440	—	—	—	—	—	—
Kapok ..	lb.	167,352	116,634	20,912	56,773	48,095	40,794	—	—
Maize and Maize Meal ..	200 lb.	—	—	—	—	—	—	199,218	5,714
		519,033	702,675	98,819	127,128	5,555	7,326	18,993	26,432

TABLE D.—QUANTITIES AND VALUES OF MORE IMPORTANT PRODUCTS MARKETING FROM
THE AFRICAN AREAS (PARTLY ESTIMATED)—(Cont.)

PRODUCE	Unit	N'YANZA PROVINCE		CENTRAL PROVINCE		SOUTHERN PROVINCE		COAST PROVINCE	
		Quantity	Value £	Quantity	Value £	Quantity	Value £	Quantity	Value £
Millet and Sorghum ..	200 lb.	24,374	36,540	4,035	4,673	206	226	470	504
Miraa (<i>catha edulis</i>) ..	Bundles	—	—	70,114	52,586	—	—	—	—
Potatoes (English) ..	180 lb.	6,984	10,476	66,666	82,004	—	—	—	—
Poultry ..	Head	2,149	531	36,398	7,542	104,525	18,297	—	—
Pulses ..	200 lb.	5,107	10,300	35,908	79,035	594	1,555	1,120	2,342
Pyrethrum ..	Tons	28½	4,800	299	72,446	—	—	—	—
Rice (Paddy) ..	150 lb.	26,616	37,025	3,996	7,500	—	—	12,470	20,080
Sesame ..	180 lb.	4,036	14,020	—	—	—	—	100	380
Sisal Leaf ..	Tons	—	—	—	—	826	23,128	—	—
Sisal Fibre ..	Score	—	35,361	23,375	44,317	—	55,130	—	—
Tobacco, green ..	..	—	—	1,974,613	43,641	—	3,938	—	—
native cured ..	lb.	—	—	1,080,946	249,341	—	65,540	—	27,750
Vegetables, Flowers and Fruit ..	Tons	—	—	9,608	480,185	—	11,897	—	5,150
Wattle Bark ..	Tons	239	2,715	37,941	—	874½	—	373	—
Total Value, 1956 ..	..	—	1,750,862	—	2,030,944	—	397,889	—	433,985
Total Value, 1955 ..	..	—	2,506,442	—	1,877,744	—	274,940	—	327,206

PART II—RESEARCH AND SPECIALIST SERVICES

(*Note.—The information that follows is merely a summary of the work of the Research Division during 1956. The reports of individual research officers and the detailed results of experiments are published later in Volume II of this Report, under the title Record of Investigations.*)

The Research Division of the Department continued to expand during 1956 with funds provided under the Colony's 3½-year Development Plan and the Swynnerton Plan for the intensified development of agriculture in the African areas, aided in some schemes with funds provided by the United States International Co-operation Administration.

In the grounds of the Scott Agricultural Laboratories in Nairobi, five small houses were built to accommodate members of the staff. Under Grassland Research, development of the main station at Kitale proceeded with the purchase of equipment and the construction of additional farm buildings. A similar development took place at the high-altitude sub-station at Marindas, near Molo. A new experimental station for the Southern Province was established at Katumani, near Machakos, for pasture research in the drier areas, breeding work on sorghum and short-term maize, fertilizer trials and general agronomic experiments. By the end of the year, much of the land on this new station had been cleared of bush and the construction of staff houses, offices, laboratories and farm buildings had been completed. Other new research centres, the development of which was practically completed during the year, were a horticultural station at Thika, primarily for research on the pineapple crop; an irrigation research station in the Mwea-Tebere area south of Embu; and a cotton research station at Msabaha, near Gede.

The staff of research officers increased from 41 to 51 and the number of other European staff in the Research Division increased from 60 to 67, the total European establishment of the Division at the end of the year being 118.

A central Agricultural and Veterinary Research Advisory Committee was set up during the year under the chairmanship of Mr. G. G. Smallwood, of Endebess. The membership of the Committee includes six representatives of the farming industry. The function of the Committee is to make recommendations to the Directors of Agriculture and Veterinary Services concerning research programmes and policy in respect of European farming and plantation industries, and to ensure that the results of research work are made known to the farming public. Farm Advisory Committees, composed of local farmers, were also set up for the Department's main general husbandry stations in the European areas at Kitale, Eldoret, Ol Joro Orok and Sotik. The purpose of these committees is to ensure that the work on these stations is directly related to local farming needs and to ensure that the research workers have the benefit of the practical experience already gained by the local farming community.

General Husbandry

AFRICAN AREAS

Grassland.—To facilitate the introduction of alternate husbandry into African agriculture, experimental work aimed at finding the most suitable grasses and legumes for leys, the best method of establishment and management of leys and of the production of dry season fodder has been in progress during the past few years at a number of stations in different ecological zones. For those areas that enjoy a good rainfall, it has been found that Nzoia Rhodes grass, Molasses grass, Star grass and the Nandi strain of *Setaria sphacelata* are reasonably satisfactory

ley grasses, with Kenya White Clover (*Trifolium semipilosum*) and lucerne as the most promising legumes. In 1956 in Nyanza Province it was shown that sown leys of Nzoia Rhodes grass and Nandi *Setaria* persist well for about two and a half years, after which, in the high rainfall areas, the natural herbage of Star or Kikuyu grass tends to take over the sown ley. In the drier areas of Southern Province, the most satisfactory grass cover was obtained from sowings of a mixture of the naturally occurring grasses *Cenchrus ciliaris* and *Eragrostis superba*. At Shimba Hills, in the Coast Province, it was shown that once soil fertility has been built up by applications of farmyard manure and phosphate, it is possible to establish productive leys from sowings of Nzoia Rhodes grass, Rongai Rhodes grass and *Setaria sphacelata*. Over much of the Coast Province, where the rainfall is lower, planted grasses were more reliable, in particular *Panicum makari-kariensis*.

Among the many crops under trial in Nyanza Province as producers of green fodder for the dry season, the Uganda hairless strain of Elephant or Napier grass (*Pennisetum purpureum*) has been shown to be by far the heaviest yielder. Mixtures of Napier grass with various legumes have proved disappointing because in all cases the legume died out during the second year. Trials of kale, fodder beet and other fodder and root crops have been discontinued because such crops have been found to be very subject to destruction by pests and diseases.

Fertilizers.—Another important series of investigations in the African areas is designed to determine the extent to which the yields of arable crops can be increased by the use of farmyard manure and fertilizers. In the preliminary phase this work takes the form of a wide scatter of exploratory fertilizer and manurial trials on the principal local food crops and covering the major soil types and rainfall belts within each Province. This is a long-term project, but as the results are obtained it should be possible to construct a map showing the basic fertilizer and manurial requirements for each locality. In the second phase, more complex experiments are in progress to provide the answers to such questions as the best type or combination of fertilizers to use, the most profitable rates and times of application, the best method of application and the length of time that the benefit from a given dressing of fertilizer may be expected to last. In 1956 a total of 116 exploratory trials were conducted throughout five Provinces, and many of the more complex fertilizer experiments were in progress on a number of experimental stations. In Nyanza Province, over large areas of the North Nyanza District, it has already been proved that profitable increases in yield can be obtained from applications of phosphate. Results from Embu in the Central Province emphasize the need for a combination of farmyard manure and phosphate in order to obtain the highest yields: in fact, in dry areas and on poor sandy soils, applications of phosphate were of little value in the absence of farmyard manure. In the Shimba Hills in the Coast Province, it has been shown that successful crop production is not possible without application of phosphate, but a dressing of 1 cwt. of double superphosphate to the acre is sufficient to correct the deficiency. Although this series of experiments is not yet completed, the indications from the results obtained to date are that substantial and profitable increases in the yield of most African food crops can be obtained in most areas from applications of 3 tons of farmyard manure and 1–2 cwt. of double superphosphate to the acre. The beneficial effects of the superphosphate persist for two to four years. The results also show that only very rarely is any additional increase in yield obtained from applications of nitrogen or potash.

Food Crop Improvement.—Work is in progress on the selection of improved varieties of African food crops for such qualities as high yield, palatability and resistance to pests, diseases and drought. In 1956, 174 types of sorghum, 96 types of cassava, 90 varieties of rice and 75 types of groundnuts were grown in

observation plots. The most promising of these types were compared in variety trials. Of the sorghums, two acceptable white-grained types, Dobb's White and Enyanza, have consistently produced the highest yields, and seed of these is now being multiplied for issue to farmers. The cassava types are being selected primarily for resistance to mosaic and brown streak diseases, on which factors the possibility of high yields largely depends, and also for palatability. The results of cultivation trials with cassava at the Coast show that increased yields are obtained from tie-ridging, but not from wide spacing. Another trial showed that higher yields may be obtained from cassava planted in July than cassava planted at the beginning of the long rains in April: the July-planted cassava had sufficient moisture for establishment, suffered no check in the dry season, and received sufficient rain in the critical ninth month period. Most of the work on rice is being done at the new irrigation research station at Mwea-Tebere, south of Embu. Of the 90 varieties tested in observation plots, 22 were rejected from the collection because of their red grain. Sindano remains outstandingly the best variety so far, though there are some other good varieties with the one disadvantage of a long growing period. Results of other experiments with rice indicated that the highest yields are to be obtained from a close spacing of single seedlings and that fairly heavy dressings of sulphate of ammonia are beneficial, both in the nursery and in the field. The work on groundnuts has produced a high-yielding variety for the Homa Bay area, which variety is now being bulked for distribution to farmers. At the Coast the superiority of the Barberton and Natal Common strains of groundnuts has been demonstrated: at Shimba Hills it was shown that an application of 1 cwt. per acre of double superphosphate resulted in trebling the yield.

Cotton.—Experimental work on the cotton crop was continued in Nyanza Province by an officer of the Empire Cotton Growing Corporation and by an entomologist of the Kenya Department of Agriculture. The work includes studies of varieties, planting dates, use of fertilizers and manures, intercropping and, most important, the control of pests and diseases. Results, both in Nyanza and at the Coast, emphasize the need for early planting to produce the highest yields and a high percentage of first grade cotton. At the Coast the varieties UK.48 and UK.51 out-yielded the present local commercial variety of cotton, N.17, by a substantial margin. Both these new varieties showed a high degree of resistance to Jassid damage, UK.51 being somewhat superior in this respect. Seed of UK.51 is to be distributed to cotton growers at the Coast.

Bracken Zone.—The problem of the most effective use of the extensive bracken-covered areas in the Central Province is being investigated at a small experimental station at Kanja in the Embu District. The climate of the bracken zone is suitable for dairying and for the production of some crops, yet the area has remained virtually unused. Earlier work showed that the soils are deficient in lime and phosphate and that both crops and grass respond to dressings of farmyard manure. Pastures of Kikuyu grass, Molasses grass and Guinea grass were successfully established with the aid of phosphate and farmyard manure and they have remained productive over a period of three years. The results of experiments indicate that, given a liberal dressing of farmyard manure, potatoes may be a profitable crop for this area.

EUROPEAN AREAS

During the year experimental work was continued on the experimental farms at Ol Joro Orok (altitude 7,800 ft.), Eldoret (7,000 ft.) and Kitale (6,200 ft.); also on departmental plots at Rongai (6,100 ft.) and Njoro (7,100 ft.), and on farms in all districts. A start was made with observational trials on the Perkerra Irrigation

Scheme, Marigat. As in previous years, much of the work comprised ley establishment trials and cereal variety trials which are mentioned later under the headings Grassland and Plant Breeding respectively.

Fertilizers.—At Eldoret a trial to test the residual and cumulative effects of applications of phosphatic fertilizers was continued for the fifth year. The fertilizers compared were equivalent dressings of double superphosphate, sodaphosphate and Uganda rock phosphate, applied to wheat for one year only, for two consecutive years, and for three consecutive years. The results showed that all three types of phosphate produced higher yields than no phosphate. The beneficial effect of a single application of double superphosphate lasted for four years. Applied in the first year only, double superphosphate and sodaphosphate had equal value, and produced higher yields than Uganda rock phosphate. Applied for two consecutive years, double superphosphate produced a higher yield than sodaphosphate, which, in turn, produced a higher yield than Uganda rock phosphate. Applied for three consecutive years, both double superphosphate and sodaphosphate again resulted in higher yield increases than Uganda rock phosphate.

Also in its fifth year at Eldoret was the trial in which is being studied the effect of phosphate applications to grassland on the yields of the subsequent arable crops. Other trials were begun at Eldoret, Kitale, Ol Joro Orok and the Kinangop to test the residual effect of an application of 1 ton per acre of Uganda rock phosphate on yields in the subsequent arable rotation.

Long-term liming studies were continued at Kaptagat, Eldoret and on the Kinangop: the results of these are reported later under the heading Soil and Agricultural Chemistry.

Drainage.—In a drainage trial at Londiani, mole drains were drawn 6 ft. apart in 1951 and they are still in good condition. In 1956 the mole-drained plots still yielded nearly a bag of wheat an acre more than the unmoled plots. At Ol Joro Orok various drainage methods are being compared using mole drains, tile drains, ridge and furrow, ditches and bush drains. Mole drains alone do not appear to be satisfactory in this area. The highest yields were obtained from land where tile drains 50 ft. and 100 ft. apart were combined with mole drains. Above-average yields were also obtained from land drained by ridge and furrow, bush drains and ditches dug with a Cuthbertson ditcher.

Animal Husbandry.—At Ol Joro Orok the comparison of Hereford $\times$ Boran, Aberdeen Angus $\times$ Boran, and Boran steers is nearing completion with the crosses some 200 lb. liveweight heavier on average than the Boran steers at just over two years old. Other nutritional and feeding trials with both dairy cattle and beef cattle were continued or begun at Ol Joro Orok, Eldoret, Kitale and South Kinangop. An interesting result evolved from the calf-rearing trial at Eldoret, where one group of calves was reared on whole milk and one group on cream equivalent, both groups in addition receiving the same concentrates and silage. Although there was no marked difference between the final weights of the two groups the cost of rearing on cream equivalent (inclusive of skim) was approximately half the cost of rearing on whole milk without taking into account housing and labour.

A pig litter feeding trial at Ol Joro Orok has shown that in every case where the creep feeding method was used, the weaning weight exceeded that where normal feeding was used, and in some cases, to a marked degree. In other pig trials the emphasis was on inside feeding compared with outside feeding of weaned pigs, feeding rations high in maize at Eldoret and Kitale, and the "Ol Joro Orok" ration at Ol Joro Orok. Until sufficient pigs have been tested in these trials, results cannot be properly assessed.

Various silage mixtures were tried, and fodder crops were compared in observation plots. At Nakuru, a maize/Lima bean mixture gave the highest yields of material, cut at three different stages of the maize, and silage made from this mixture contained 10-12 per cent crude protein calculated on a dry matter basis. Baled silage was made for what is thought to be the first time in Kenya on a Nakuru farm with the co-operation of the International Harvester Company Limited. The crop was Lampton oats, cut when the grain was at the milk stage, and a recent inspection showed that first-class sweet-smelling silage had been achieved.

It was found that lucerne outyielded Russian comfrey under Ol Joro Orok conditions, and there also the fodder beet variety Brenstedt was outstandingly better than other varieties. At Naivasha, *Coleus* weed has been successfully controlled by spraying which, combined with resting, has resulted in the restoration of a flourishing Star grass pasture.

At the Perkerra Irrigation Scheme promising results were obtained in trials with maize, groundnuts, onions, citrus and the fibre crop *Hibiscus cannabinus*.

Grassland

Steady progress has been maintained at the main station at Kitale (6,200 ft.) and at Molo sub-station (9,000 ft.), while development work has gone ahead well at Katumani station (5,400 ft.) near Machakos, which serves the semi-arid areas in that region of the Colony. The officer stationed at Marigat in the Baringo Reserve has made an extensive survey of his area as a preliminary to experimental work, and the officer appointed for the European ranching areas has arrived in the Colony after a three-month post-graduate training course on ranch research stations in the U.S.A. He is now (January, 1957) spending a further period in training on a ranch in Kenya to learn about ranching practice in the Colony.

The season at Kitale has been a satisfactory one. Rainfall was above average (45 in.), varying from 45 in. on one part of the station to 50 in. on another part. The distribution of the rain was also satisfactory, though unusual for January to March, as in these three months 7.8 in. were recorded.

Plant Introduction.—Plant introduction work has brought to light a number of interesting and promising species which will be examined further next season. These are as follows:—

Sainfoin (*Onobrychis sativus*) has shown itself to be productive, persistent and almost free of leaf spot diseases, and may well be a useful fodder crop.

Giant *Setaria* (*Setaria splendida*) varieties are being examined to find one which seeds well and produces a leafy, productive and more uniform type. So far this species has been vegetatively propagated.

Ronpha grass, a hybrid between two *Phalaris* species, is still in the early stages of propagation. It produces no fertile seed. It is too early to make any comments.

Phalaris daviesii is a fertile hybrid of *P. tuberosa* and *P. minor*, and may be useful at higher altitudes than Kitale. It does better here than *P. tuberosa*.

Subterranean Clover is a promising plant and 24 new varieties from Australia have been tested. The variety "Derinal" seems promising, while "Dwalganup", a variety in commercial use, is the best seed producer of all.

Among Kenya White clovers (*T. semipilosum*), the varieties from Kabete and Ol Joro Orok still seem to be the best. A new variety of white clover (*T. repens*), obtained from Bamenda in the Cameroons, where it appears to have become naturalized, has given good results here and will be bulked up next season.

Progeny testing with African Foxtail grass (*Cenchrus ciliaris*) and Molasses grass (*Melinis minutiflora*) indicates that they do not cross-pollinate, as adjacent plots of different varieties appear to breed true to type. This is not so in Rhodes grass (*Chloris gayana*), which seems to cross-pollinate readily.

The mechanism and time of flowering has been studied in Rhodes grass and Signal grass (*Brachiaria brizantha*). All this information will be valuable in future plant breeding work.

In preliminary grazing trials, which follow on after the nursery work, new varieties of Rhodes, Molasses and Star grasses have been tested. Other species which have shown up well in these trials are *Paspalum paniculatum*, *Beckeropsis uniset*a, Louisiana White clover (*T. repens*), and Subterranean Clover, of which the Dwalganup variety produced the most seed and Mount Barker abundant leaf with very sparse seed production. *Desmodium uncinatum* and Smooth Peruvian lucerne also showed up well in the mixed sward with Rhodes and with Molasses grass. The two indigenous clovers, *T. rueppellianum* and *T. usambarense* were too strong in their growth and suppressed the grasses, except for one strain of the former one out of the four tried, which was less aggressive.

Herbage Agronomy.—The Herbage Agronomy work was concerned with experiments on the evaluation of species and mixtures for use in leys.

It was found in one experiment, that in the establishment year, the addition of Kenya White clover and lucerne to grass species caused a reduction in the yield of dry matter when compared with a sward consisting of grass alone. In the second season, the grass/legume mixture and the sward of grass alone gave approximately equal yields of dry matter, but the grass/legume mixture gave a better yield of protein per acre than the grass by itself. This reduction in the first year need not be inevitable, and it may well be connected with the sulphur deficiency found in the soil this season. Work on this is described further on. Non-irrigated lucerne in its third season has yielded six tons of green material per acre irrespective of row spacing from 1–4 ft. On the basis of previous yields, and ease of mechanical cultivation, 3-ft. rows are probably about the most satisfactory.

A comparison of lucerne with Russian comfrey has shown that on manured plots, over nearly two seasons, lucerne produced just over four tons of dry matter, and Russian comfrey just under 3½ tons. Owing to the ease of sowing lucerne and also of ploughing it under, compared with comfrey, and also the nitrogen-fixing of lucerne, it seems preferable as a fodder crop in comparison with Russian comfrey.

The lucerne variety trial confirms the good performance of the following varieties: Saladina, Pampeana, Smooth Peruvian, Hairy Peruvian, all from South America, and a variety of *Medicago falcata* from the U.S.A. The other varieties mentioned in last year's report, Buffalo and Calverde, seem to be surpassed by those mentioned above. Final results of the lucerne variety trial will not be available for some time.

Management trials on general purpose leys have shown the importance of maintaining the herbage in a tall condition, with no close mowing of residues, during the growing season. Close "down-to-the-ground" grazing is not suitable for the tall grasses which occur at medium altitudes in East Africa. For production of green fodder for use in the dry season, experiments show that it should be cut or grazed as sparingly as possible during the rains, and preferably rested for the whole rainy season for best results.

Pot tests, carried out by Dr. E. M. Chenery, of Kawanda Research Station, Uganda, indicated a definite sulphur deficiency in Kitale soil. The correctness of this indication was shown when sulphate of lime, as ground gypsum, applied at $1\frac{1}{2}$ cwt. per acre late in the season, produced rapid and striking yield increases in lucerne and Kenya White clover, and to a lesser extent in Russian comfrey. Dr. Chenery's valuable assistance in this is much appreciated.

Experiments on legumes confirmed last year's findings, that the use of phosphate and an inoculant are necessary to obtain maximum production from pasture or fodder legumes. The ones used in the experiments were Subterranean clover, Dwalganup variety, Louisiana White clover (*T. repens*), Rueppells clover (*T. rueppellianum*), Sweet Blue lupin and lucerne, Provence variety. The use of phosphate together with inoculant increased dry matter yields from about 45 per cent in lucerne and Subterranean clover (Dwalganup) to over 200 per cent in Louisiana White clover. It also increased the yield of protein and phosphorus per acre. It is proposed to publish these results later this year (1957).

Animal Agronomy.—Animal agronomy work has now begun and will be concerned with the evaluation of ley species and mixtures by means of meat and milk production. Experiments this season have been of a preliminary nature. One was concerned with a comparison of the grazing behaviour of Boran and grade cattle. The other was on the evaluation of a poor natural pasture consisting mainly of *Loudetia kagarensis*. This had a crude protein content of under 3 per cent both before and after grazing and the young cattle lost weight rapidly on it.

Seed Multiplication.—Seed multiplication work on a field scale during the season was concerned mainly with Kenya White clover (*T. semipilosum*), Slender Guinea grass (*Panicum maximum* var. *trichoglume*) and Nandi Setaria (*Setaria spachelata*).

For the Nandi Setaria seed certification scheme, the station has produced both foundation seed and mother seed. The latter will be supplied to farmers in the coming season for the production of certified seed for sale on the open market. Bunt disease of the seeds has given some trouble during the season and its control is now being investigated.

Other species, such as Rhodes grass, White clover, Slender Guinea grass and lucerne are expected to come into the seed certification scheme in the near future.

Chemistry.—In the chemistry laboratory, results of a study of the technique used for filtering the acid digest in the conventional method for determining crude fibre in accordance with the Fertilizers and Feeding Stuffs Regulations, 1932, are reported in relation to an examination of the crude fibre content of fodders, faeces and concentrates.

The possibilities of using an acid digestion only for a "crude fibre" determination are discussed in relation to results obtained by digesting Kikuyu grass and Rhodes grass—feeds and faeces—for different time intervals with different concentrations of sulphuric acid.

Equations relating (i) digestible crude protein and crude protein; (ii) percentage digestibility of crude protein and crude protein; and (iii) crude fibre and crude protein, have been derived from the results of analysis of over 70 samples of local plant materials.

The results of a three-year experiment on Star grass, followed by a test crop of swedes are reported, together with new work begun this year on the phosphate requirements of grazed Star grass pasture.

High Altitude Sub-Station, Molo.—Development of the Molo sub-station now shows results as it is equipped and fenced sufficiently to carry the stock necessary for the experimental work. The welcome arrival of a second European officer was, however, too late in the season to relieve the Pasture Research Officer of development and stock work, consequently there was a reduction in the amount of experimental work done. The flock of 200 Corriedale ewes will be used primarily for ley and pasture evaluation. A herd of Red Poll cattle is also being built up.

A comparison of short-rotation rye grasses has shown that in the establishment year Westerwolths yielded nearly 11 tons an acre (green weight) compared with 5–7 tons from the Italian and H.I. rye grasses. A top dressing of 4 cwt. to the acre of N.A.C. fertilizer increased yields by about 6 tons per acre. Lime and molybdenum studies are continuing on old arable land where it appears unlikely that lime dressings of under 3 tons an acre will be effective on lucerne. Lucerne and serradella have both responded to molybdenum this year, but more needs to be known before recommendations can be made. A field comparison of basic slag (2½ cwt.) and triple superphosphate (1 cwt.) resulted in kale yields being nearly doubled with the slag treatment.

Nodulation observations tended to confirm the Kitale result—good and effective nodulation being confirmed with commercial inoculants. These increased Subterranean clover yields threefold, and the results augur well for the use of Subterranean clover on land which is too acid and lime-deficient for the imported white clovers.

M.C.P.B. weedkiller was shown in spraying trials to be practically non-toxic to spurrey and its use is not recommended where this weed is troublesome.

In the field scale work 12 acres of S.24 perennial rye grass was established by drilling at 12 lb. an acre under 30 lb. of oats. Growth of lambs on this ley was good, weights of 90 lb. liveweight at 5½ months being recorded. It is likely, however that the provision of some roughage would have increased the liveweight gains and balanced the high protein available in the rye grass in its maiden year.

Coffee

ENTOMOLOGY

Coffee Leafminers (*Leucoptera coffeella* Guer and *L. Caffeina* Washb.). experiments on the control of the larvæ of these insects in their mines has continued. Diazinon has proved to be the most efficient insecticide so far tested. In experiments and in spray applications carried out by growers, kills of larvæ in the region of 95–100 per cent have been achieved.

Antestia (*Antestiopsis* spp.). Outbreaks of Antestia were again experienced towards the end of the cropping season. Opportunity was taken to test various insecticides, and of them Malathion showed the most promise. The optimum concentration of Malathion for use against Antestia had, however, not been determined by the end of the year.

White Borer (*Anthores leuconotus* Pasc). Dieldrin spray-banding proved its worth against this insect in the experiment mentioned in the 1955 Report. The method will, therefore, be adopted for routine control of White Borer in coffee.

Coffee Lacebug (*Habrochila* sp.). This insect had hitherto been thought to occur only in coffee west of the Rift Valley, but colonies were found in coffee in the Central Province during the year. No outbreaks occurred in the Central Province, however, as the insect was in association with its natural enemy, a Mirid predator, *Stethoconus* sp.

Coffee-leaf Skeletonizer (*Leucoplemma dohertyi* Warr). The larvæ of this moth caused serious defoliation of small areas of coffee in the Ruiru District during the year. Damage was in evidence, to a lesser degree, on a number of estates. It was found that dusting with a synergized pyrethrum dust gave good control of the larvæ on the leaves.

Field Trials.—Mulching. The 1956 yields from the mulch and soil regeneration trial have confirmed the value of mulch to coffee grown under dry conditions. While the unmulched plots yielded at the rate of 12.17 cwt. of clean coffee per acre, the mulched plots produced 20.88 cwt. per acre. Over the seven years 1950–1956, the mean annual yield of the mulched plots has been 33 per cent greater than the unmulched plots. This represents a mean annual increase in yield of between 2 and 2½ cwt. of clean coffee per acre.

The Rotavator trial, which also includes mulching treatments and has now run for three seasons, has shown a 39 per cent increase as a result of mulching. This represents a mean annual increase in yield of 2 cwt. of clean coffee per acre.

Anti-leaf-fall (formerly Tonic) Spraying. Two years' results from trials at the Coffee Research Station, Ruiru, and the sub-station on North Kitito Estate, at Makuyu, have both shown increases in yields of clean coffee of about 35 per cent following spraying with a 2 per cent copper spray during the long rains.

In May, 1956, a new trial was begun at the Coffee Research Station to test the effect of applying only 10 gallons per acre, using a sprayer producing very fine droplets. Least leaves fell from the trees treated with a 2 per cent copper spray at 10 gallons per acre and it is probable, therefore, that in 1957 these trees will yield more than trees which lost more leaves.

Cambered Beds. The trial of the Camber bed system of cultivation on *vlei* land areas is providing very interesting results. Good yields of Napier grass (*Pennisetum purpureum*), as a grass mulch crop, were cut and the plant crop of pineapples which was also harvested gave excellent yields. This system of cultivating otherwise non-utilized land areas is on the way to becoming an important part of Kenya's agriculture, although its full potential has by no means been completely defined to date.

Coffee Berry Disease.—The work has, firstly, resulted in the development of techniques for the study of the fungus and disease under controlled conditions. Studies of the infection process, and its relation to both host variety and climatic factors are almost complete. All varieties of coffee so far studied can be infected under appropriate conditions, and there is no evidence of any variation in the resistance of the tissues of the fruit of any variety. Such resistance as does occur would seem to be resistance to penetration of the epidermis. Infection requires the presence of liquid water on the surface of the fruit. The optimum temperature for infection and for germination is 72° F., and temperatures lower than 62° F. or higher than 87° F. inhibit infection. The techniques and knowledge now available will be used to correlate the incidence of the disease in the field with climatic conditions.

It has been found that the pathogen is present throughout the year in the cortical tissues of young twigs, and also in the stipules. When climatic conditions are suitable, spores can be produced, and there is thus a constant potential source of inoculum throughout the year, even when no crop is on the trees. These spores are the source of fresh outbreaks, in particular, on the flowers; and it has been found that considerable and hitherto unsuspected losses can be caused in the very early stages of the crop. Although the fungus is usually confined to the tissues outside the phellogen, penetration into the deeper cortex can occur under appro-

prate conditions, in which case "Elgon dieback" results. From all specimens of this form of dieback so far examined, the Coffee Berry Disease fungus has been isolated, and typical dieback has been produced in the laboratory by inoculating twigs with fungus derived from berry lesions.

A laboratory method for assessing the efficacy of fungicides is being utilized, and this has enabled a number to be eliminated without the necessity for field tests.

A very comprehensive series of field trials has been carried out during the year at Cherangani, Kitale Savani, Lumbwa, Nyeri and at four sites in Upper Kiambu. These are expected to yield preliminary information on the relative merits of four different fungicides, and on the effects of varying frequency and time of application. The experiments, nine in number, cover an area of nearly 57 acres, and comprise 488 plots with a total of over 30,000 trees. Harvesting is now proceeding, and present indications suggest that, at least in some districts, control at an economic level is being secured by the use of organo-mercurial sprays.

As regards the distribution of the disease, there is evidence that it is increasing in range in the East Rift area, having appeared on plantations hitherto free, and lower than previously recorded. For instance, it has been seen causing severe loss at an altitude as low as 5,300 ft. on African-grown coffee in the Karatina District.

Physiology.—Investigations on anti-leaf-fall spraying have continued. The Solai trial of time of spraying, concentrations and rates has been concluded, an unfortunate misunderstanding having precluded the recording of the final crop. The similar trial set up at Kitale has now produced its fourth crop. In the field trial at the Coffee Research Station on the effects of copper and non-copper sprays, etc., yields have been very low and the relative responses to the treatments are largely as expected, the reverse of last year; the two-year yields, however, maintain the same relative responses as in 1955. Fernide has been markedly more effective in controlling leaf-fall than copper, no doubt due to the extra controlling effect this treatment will have had on leaf rust, which was very bad this year. The hormone treatment has been more effective in controlling leaf-fall than before, presumably due to more frequent spraying, but it is still not as good as copper fungicide. In the second trial of concentrations and types of spray, the yields were so low as to be not worth analysing.

Greater attention is now being given to problems of leaf rust control and a general article on this disease has been published. Considerable success in forecasting epidemics has so far been obtained. A comprehensive set of investigations of germination and penetration in relation to environmental conditions has been commenced in order that forecasting may be further improved and better methods of rust control devised. Some studies on physiologic races in co-operation with the Portuguese Coffee Rust Investigation Centre have also been initiated.

The maleic hydrazide trial at Cherangani, near Kitale, has been continued as has also growth recording at the Scott Laboratories and the Coffee Research Station.

Chemistry.—Studies of soil nitrogen have been intensified and broadened to include all relevant aspects of the problem. Some substantial progress has been made in the investigation of the conditions affecting the mineralization of natural and fertilizer nitrogen, related to the nutritional requirements of the coffee tree, in particular, the influence of soil moisture, temperature and grass mulching.

The investigation of chemicals suitable for weed control in coffee has been continued. In the full-scale yield trial in which P.C.P. and P.C.P. + 2, 4 - D. treatments have been applied for three years now, some definite evidence of chemical taint in the coffee liquor induced by P.C.P. application was found when samples from the 1955/56 crop were examined.

A range of potentially useful herbicides is now under preliminary observation. Two in particular, known as C.M.U. and Dowpon, appear most promising. As a pre-weed emergence spray at very low rates of application, C.M.U. has given a good mixed weed control, but was not effective against couch grass (*Digitaria scalarum*). Dowpon, on the other hand, has produced effective control of couch grass, and shows every sign of becoming an important factor in couch control generally.

Pyrethrum

Breeding.—At the various stations 434 new single plant selections were made. The total number under observation was 635. Altogether 299 tested clones have been bulked up as material for further breeding work. In addition, 20 clones were multiplied under irrigation at Londiani in readiness for seed production during the next seasons. Considerable quantities of seed were delivered from the stations, mainly C.43, C.47, C.51, 100.A and Subukia Bulk. New seed production fields were established at Molo for C.60 and C.79. Twenty-four new crosses were made in isolated plots and 12 large plots were laid down for the second and third stage respectively of the "sugar beet" breeding system at Subukia and Molo. The number of yield trials distributed over a wide range of the pyrethrum growing areas was 22. Of the more recent hybrids, O.1, O.4, M.9, M.11, M.15, M.18 and M.21 are worth mentioning, while C.35, C.51, C.60 and C.79 have again given a good performance.

Studies on pollination and seed setting have proved that cross-pollination is the rule in the pyrethrum flower, while selfing occurs only rarely.

Pests and Diseases.—The cold and sunless months of July and August resulted in a fairly heavy infection of *Ramularia bellunensis*. Selection and breeding for resistance to this fungus continued. Thrips (*Thrips tabaci*) attacked flowers and foliage in a number of cases, mainly towards the end of the year when the effect of drought became more pronounced. Eelworm (*Heterodera marioni*) caused severe damage at least in one case, probably in connexion with other factors.

Weedkillers.—No new trials were carried out in the field, but the Senior Pyrethrum Officer, while on leave in the United Kingdom, consulted Prof. Blackman, at Oxford, and the research staffs of Messrs. Plant Protection Limited and Fisons Pest Control Limited about the more recent development in hormone and chemical herbicides. More tests are planned for 1957.

Stripping trials.—The experiment, planted at Molo in 1954, has again proved that stripping down to and including buds has a detrimental influence on the yield of pyrethrins, while little or no difference was recorded between the yields of stripping to flowers with horizontal and vertical petals respectively. In the trial laid down at Ol Joro Orok in 1955, the results were somewhat obscure in so far as stripping down to and including buds produced the highest yields. These were, however, comparatively low in general and it is felt that not too much importance should be attached to this season's results only.

Fertilizer Trials.—Nineteen trials were in progress and these were distributed over a wide range of the growing areas. Studies on minor elements were started.

The beneficial effect of phosphatic fertilizers was confirmed on certain soil types at Upper Molo, Dundori, Thomson's Falls, Ainabkoi and on the Kinangop: in several cases planting on the ridge increased the yield.

Irrigation Trial.—This trial was started in 1955 but yielded no comparable results in the first season as rainfall was unusually heavy in December, 1955, and January, 1956. Two levels of irrigation (1 in. and 2 in.) are applied whenever log-ohm readings on the plots indicate the necessity for watering. In spite of regular treatment, in 1956 again no difference in yield could be recorded between the controls and the irrigated plots. This occurrence is difficult to explain and requires further studies.

Sisal

Nurseries and Planting Material.—The two nursery trials in progress at the Station were lifted during the year and replanted. Significant responses were obtained to the applications of sulphate of ammonia in both trials, but the responses to other nitrogenous fertilizers were insignificant. The response to sisal waste was disappointingly low and is attributed to the very uneven size of the plants lifted, as was manifest in the previous cycle, and this point is receiving constant attention in the present and future cycle.

The slowness of growth in the nurseries, which do not produce a reasonable plant in less than 18 months, is attributed to a lack of moisture, so a trial was planted in 1956 incorporating treatments for sisal waste, nitrogen in the form of urea and irrigation in the low-rainfall months.

The Planting Material Trials demonstrated clearly the advantage of planting out into the field as big a plant as it is possible to do economically. Collection, grading and transport of excessively large planting material is expensive, but if plants less than 20 in. high are planted out, the time one has to wait for the first cut is prolonged unduly. The difficulty of grading suckers is quite obvious but there is no reason why it should not be done provided the grading is severe and it is realized that a large percentage of the suckers would have to be discarded. This collection of suckers cannot be recommended as a general practice, and it is obviously easier to get a large number of fairly even plants from a nursery, but when one considers the area that is needed for slow growing nurseries in order to guarantee a regular supply for a planting programme, it is possible that the severe and lengthy business of grading suckers from young fields may be, in lean times, less costly. As the trial comparing suckers to slightly smaller nursery plants has shown, there is only little difference between them in growth and the fibre yields to date: thus, well-graded suckers may be worth considering as planting material, although nurseries must be considered the ideal. If the collection of suckers ensures desuckering in young fields, which might otherwise be neglected, another advantage is gained.

Plant Management.—The findings from the five external spacing and cutting trials reported in our 1955 Report, have not changed to any great extent. In the trial at Kibwezi, it was noticeable that the double rows stood up to drought conditions better than the single rows, presumably due to better shading of the soil beneath the plants. In this trial the incidence of bole rot is also common and appears, to some extent, to be connected with the earliness of the first cut and the intensity of the subsequent cuts. Bole rot is being studied in conjunction with the Sisal Experimental Station, Mlingano, Tanganyika Territory, and as the nutrient status of the soil may have something to do with the incidence of the disease, it is being studied in the fertilizer trial at Kibwezi.

Fertilizers.—The fertilizer trials have, without exception, shown a response to sulphate of ammonia. The size of the response varies from trial to trial, and was most spectacular on the murrum soils at Ruiru and the grey soils at Kampi ya Moto, where about 10 more leaves were produced per plant before the plant had produced 90 leaves, that is in a period of about $2\frac{1}{2}$ years.

A response to double superphosphate was obtained only on the murrum soils at Ruiru: in all the other trials there were no responses at all or the responses were small and lasted less than a year.

Whether the lack of response to phosphate is due to the form in which it is applied is being investigated in a Phosphatic Fertilizer Comparison Trial which was planted during the year, and 75 lb. per acre of P_2O_5 were applied under the plants at planting in the form of double superphosphate, Uganda rock phosphate and basic slag.

A small response to lime was obtained in one trial only, on Thika's red soil, where sisal had grown over several cycles.

With the exception of the lowest application of $12\frac{1}{2}$ tons of sisal waste per acre at Kampi ya Moto, it can be said that wherever and in whatever quantities sisal waste was applied, there was a response in the growth of the plant expressed in more and longer leaves per plant. It is, however, clear that the boost the plants get is transient and the extra number of leaves produced per plant is produced within the first 18 months to $2\frac{1}{2}$ years, depending on the rate of application. The plants will maintain the lead over untreated plants, but it becomes increasingly obvious that the satisfactory fertilizing of sisal fields is not done by applying everything at planting time. This point has been foreseen and several of the fertilizer trials are now due for repeat applications of fertilizers. What is now clear is that it may be advisable to make the repeat applications considerably earlier than was anticipated.

The rate at which leaves are produced annually has come under close scrutiny during the year. The alarming way in which the annual increase falls off after the third year is a matter for concern and raises the need for trials with fertilizer applications commencing or being re-enforced at the point of wane.

There can be no doubt now that the growers are becoming increasingly aware of the possibilities of obtaining higher yields per acre, and also of the reduction in yields which will follow when nothing is returned to the soil. The necessity for maintaining or increasing the fertility of sisal fields is becoming of paramount importance.

Hybrids.—There is nothing to add to the remarks about *Agave* hybrids mentioned in last year's report except that plants from 19 other hybrids were received during the year from the Sisal Research Station at Mlingano, and that they were planted in nurseries and will be carefully observed in the coming years.

Weedkillers.—The most promising herbicide under observation during the year was Dowpon (Dalapon) which, at 15 lb. per acre, has controlled couch completely from the end of October till the end of the year in spite of nearly 8 in. of rain in 20 days during this period. The Dowpon was applied to dry soil before planting the sisal and no ill-effect has been noticed on the sisal plant. When Dowpon was applied to growing sisal, a leaf-tip dieback developed on the plants which was in direct relation to the quantity applied, but the leaves which unfurled after the application had been made appeared to be unaffected. Other herbicides were tested during the year on broad-leaved weeds and grasses, with inconclusive results.

Sugar Cane

Varieties.—Sugar cane variety trials at Miwani show that CO.331 and CO.419 are still the highest yielding varieties so far tried, but the incidence of ratoon stunting disease in this area and, in fact, all over Nyanza may be masking the true qualities of other types. A scheme for the eradication of ratoon stunting disease is about to be put into effect.

Fertilizers.—At Miwani a fertilizer rates trial with reapplication of all N.P. & K. treatments to the first ratoon crop showed a highly significant effect of sulphate of ammonia at 280 lb. and 560 lb. per acre over control, other treatments showed no significant differences. The trial using molasses and filter press mud in combination with sulphate of ammonia, yielded no significant effects in the first ratoon crop to which no repetitive treatments were applied.

At Ramisi in the Coast Province, both phosphate and nitrogen have given good results. Very substantial and highly economic increases in sucrose yield have been obtained. The best rates of application to the ratoon crops have been 2 cwt. per acre of both single superphosphate and sulphate of ammonia, whereas up to 4 cwt. of sulphate of ammonia can be used with marked economic benefit on the plant crop.

Drainage.—An unreplicated drainage trial with sugar cane in South Nyanza using the variety CO.421, showed that yields of about 60 tons per acre of cane may be obtained in this area from a plant crop; this figure compares well with those obtained in Departmental plots at Miwani.

Horticulture

General Developments.—The year was marked by considerable development of the horticultural industry in many of its aspects. The formation of the Horticultural Products Committee, on which are represented members of the processing industry, the Horticultural Co-operative Union, the Kenya National Farmers' Union and field and research services of the Agricultural Department, is already resulting in better organization of the industry through improved liaison.

The canning industry has had to face increased competition in the sale of canned pineapple, but increased production by both European and African growers is enabling canneries to operate with a bigger turnover. The installation of a modern tomato *purée* plant by Kabazi Cannery Limited, which will be in operation by January, 1957, marks the start of production in what is likely to prove an important new branch of the industry. The initial acreage of tomatoes is being grown at the Perkerra Irrigation Scheme. Increased production of passion fruit juice is planned through new plantings of the crop by Africans in the Elgon Nyanza and North Nyanza Districts. Purchase of the crop has been arranged with Mount Elgon Products Limited, who will process the fruit at their factory in the Kitale District.

Export of fresh pineapples to England by air has been continued on a small scale, but an important development is the successful export trial consignments of fresh pineapples by sea, which has been carried out by the Horticultural Co-operative Union. Further consignments are held up pending reopening of the Suez Canal. It is hoped that this trade, when resumed, will develop on a considerable scale with fruit grown in Nyanza Province. Suitable methods of packing, for export by air to England, of strawberries and asparagus, are being tried out on the local market in co-operation with the Horticultural Co-operative Union, with a view to making trial consignments next year.

Onion Trials.—Closure of the Suez Canal has resulted in supplies of Egyptian onions, which are normally imported into Kenya and Uganda in large quantities, being cut off. This provides an excellent opportunity for developing onion growing in Kenya, for the local market and for export to neighbouring territories. To investigate the possibility of producing an onion with reasonable keeping qualities, a series of trials was planted in different climates with onion sets, no seed of suitable varieties being available at the time. Preliminary results indicate that onions of comparable quality to those imported from Egypt or Tanagnayika can be economically produced from sets. The Bombay variety is already being successfully produced from Indian seed on a considerable scale in Lumbwa District. Production of suitable onions is, therefore, possible from either seed or sets.

Pineapple Trials.—There have been some interesting results from pineapple trials in the Thika area. The original fertilizer trial laid down in 1951 has been completed with the harvesting of the second ratoon crop. The residual effect of 2,000 lb. per acre of sulphate of ammonia applied in 1951/52 was still evident in the second ratoon crop. Yield per acre from the sulphate of ammonia and nil treatments for the three crops combined was 39.0 tons and 30.5 tons respectively (10,000 plants per acre). The plant crop yield from a fertilizer trial planted on camber beds on badly drained *vlei* soil at the Coffee Research Station, Ruiru, shows that very good yields can be obtained from this type of soil with proper treatment. The most successful treatments were cattle manure at 10 tons per acre which gave 27.21 tons fruit per acre, and sulphate of ammonia at 10 cwt. per acre, which yielded at the rate of 26.04 tons per acre. The nil treatment gave 22.72 tons per acre (14,520 plants per acre). Other successful trials demonstrated an increase in the second ratoon pineapple crop by spraying with growth substances to induce flowering, and the cure of acute chlorosis, which occurred over a considerable area on one farm, by spraying with iron sulphate. A bulletin describing the culture of pineapples was written by Mr. H. R. Evans.

Tree Fruits.—A comparison of yield from irrigated and unirrigated citrus at our Kitale and Ruiru sub-stations, indicates that better yields might be obtained if the trees were dried off by withholding irrigation for a period each year; this problem is to be investigated. An article, entitled "The Mangoes of the Kenya Coast," by Mrs. S. M. Wheatley, was published in the *East African Agricultural Journal*, in July, 1956.

Long-term deciduous fruit trials were continued at Molo. The value of wind-breaks in orchards was strikingly demonstrated by measurement of total extension growth for one season on young apple trees. The results speak for themselves:—Total growth of 32 trees on windward side of windbreak, 21 ft. Total growth of 32 trees on leeward side of windbreak, 208 ft. A trial of hand-thinning on plums demonstrated that the annual glut of low-quality fruit on the local market could be eliminated if growers would thin the crop in its early stages. In this trial, thinning improved fruit quality to such an extent that the cash return from a tree carrying 70 lb. of thinned fruit was greater than that from a tree bearing 200 lb. of unthinned fruit.

Berry Fruits.—Improvements in the cultural treatment of strawberries resulting in very high yields, have been described by Mrs. E. B. Jackson in an article published in *East African Farmer and Planter*. A second article by the same author, on cultivation of Youngberries was published in *Field, Farm and Garden*, in September, 1956.

Vegetables.—A considerable number of observational trials on vegetables were carried out in the Teita Hills and at Taveta, with the object of improving the local vegetable industry. Two tomato variety trials at Hoey's Bridge and at the

Mwea/Tebere Irrigation Scheme, to test varieties for *purée* manufacture, were successfully concluded. An article on asparagus growing in Kenya by Mrs. B. E. Jackson, was published in *Field, Farm and Garden* in March.

Plant Pathology

Plant Diseases.—Five hundred and sixteen specimens of plant disease material were dealt with. In connexion with these, 90 visits were paid to the laboratory. Some 50 of the specimens were of diseases of cereals. The remainder covered a wide range of temperate and tropical crops.

Fourteen disease fungi, hitherto unrecorded from Kenya, made their appearance. These included *Physoderma maydis* and *Sclerospora sorghi* on maize, two leaf diseases of Pigeon Pea, *Cercospora cajani* and *Uromyces dolicholi* and *Ramularia amoraciae* on horse radish. This last and *Ophiobolus oryzinus* on rice are apparently new records for East Africa. Two diseases, Anthracnose of the vine, *Elsinoe ampelina* and the dry rot of maize, *Diplodia zeae*, reappeared after an apparent absence of some 20 years

A number of instances of the bacterial wilt of potatoes, *Pseudomonas solanacearum* occurred in most districts. Owing to the persistent wet weather, there was some loss of seed pieces in the ground and a degree of tuber loss in store and transit, in the coloured skin varieties being most markedly affected. Contrary to expectations, the incidence of blight, *Phytophthora infestans*, appeared to be less than in the preceding year. This disease did, however, cause much loss on tomatoes.

A serious and widespread outbreak of Bunt, *Tilletia echinosperma* on *Setaria sphacelata* hampered the production of seed for distribution. *Panicum maximum* in experimental plots was attacked by a disease causing malformation of the stems and reduction of flowering. The causal organism appears to be a *Phycomycete* of an undermined affinity. A new species of *Helminthosporium* is the cause of a serious disease of Rhodes grass, *Chloris gayana*, at the Grassland Research Station, Kitale. Panama disease of bananas, *Fusarium oxysporium* f. *cubense*, was found for the first time in the Nairobi area. Inquiries concerning ornamentals were more numerous than in any previous year and involved some new fungus records. Prominent among these diseases was the *Botrytis* disease of *Gladiolus* which, together with rust, *Uromyces gladioli*, caused much loss of commercial crops. The root knot eelworm, *Meloidogyne* sp. was present on a wide range of cultivated plants.

There were 105 additions to the Cryptogamic Herbarium during the year. Of these 33 were sent to the Commonwealth Mycological Institute and 22 determinations were received.

Blight-resistant Potatoes.—The multiplication and distribution of the blight-resistant potatoes, from Dr. Black of the Scottish Plant Breeding Society, continued. Four of the varieties were selected for multiplication at the Scott Laboratories with the production in all of 70 bags. Twenty-three bags were distributed to European farms in favourable potato districts and 47 bags to experimental farms in the African areas. Thirty-five of the varieties were maintained in the observation plots at the Scott Laboratories. The second growing of the commercial varieties imported in 1955 was done as a further step towards the stocking of the proposed potato distribution and experimental centre.

Legume Inoculants.—Two hundred and fifty-two orders for 1940 units of inoculant were received during the year. This inoculant was sufficient to inoculate approximately 55,000 lb. of seed. Forty per cent of the inoculant was for lupins, 13 per cent was for lucerne, 12 per cent for clovers and 35 per cent was for

miscellaneous legumes such as beans, soya, peas and various tropical and local species. Fifty-eight per cent of the orders came from farmers and growers, and 21 per cent from Government stations in Kenya. Twenty-one per cent came from the following countries abroad:—Tanganyika, Uganda, Portuguese East Africa, Northern Rhodesia, Southern Rhodesia, South Africa, Madagascar, the Seychelles, Mauritius, Australia, the Philippines, Hawaii and the U.S.A.

Apart from preparation and dispatch of inoculant, most of the year's work in legume bacteriology consisted of routine isolation, testing and maintenance of cultures. A new test method has been devised and details of this are being published separately.

Seed Testing.—Samples of seed tested during the year amounted to 1,560, compared with 1,593 samples in 1955. These included tests carried out in connexion with the Annual Maize Competition and tests on samples submitted for competition at the Royal Show. The usual half-yearly germination checks on their stock were carried out for one of the local seed firms. Samples of barley for germination tests were received from as far away as Ruanda Urundi and the Belgian Congo.

Further experiments were done on vegetable seeds received from abroad by one of the local seed firms. These were tested by the exporting firm before export, tested on arrival here after a sea voyage, and then returned by air and retested by the exporting firm against the stocks held by them.

A series of maturation experiments on germination of barley on sterilized sand and on unsterilized soil was continued throughout the year.

Special tests were carried out in connexion with field experiments on Cocksfoot and *Setaria* at the Grassland Research Stations; on barley and oats at the Plant Breeding Station, Kitale, and on stored cotton seed from the Coast.

Entomology

Work on Barley Fly continued. Good control was given by aldrin and dieldrin wettable powders used as seed dressings. An endrin spray gave promising results on barley which had not had a seed dressing.

An aerial spraying of maize gave no increase in yield in Stalk Borer trials, but some protection was given by hand dressings of D.D.T. and endrin.

Good control of Black Wheat Beetle was obtained with aldrin and B.H.C. seed dressings.

A caterpillar, *Argyrotagme niobe*, caused severe defoliation of wattle in the Uasin Gishu. Studies which were made of its life history included work on parasites and predators.

A severe outbreak of Army worm occurred throughout the Colony, causing heavy damage to grazing. A D.D.T. spray controlled it in crops.

Work on Pineapple Mealybug continued and the dipping of planting material for five minutes in diazinon 60 per cent, one part in 600 of water, or malathion 50 per cent, one part in 500 of water, has proved satisfactory in reducing the initial infestation, and is recommended.

Control of False Codling Moth with endrin showed promise, but further tests are required.

Good control of a Thrips in bananas was given by a single spraying of dieldrin with coumarone resin.

Attempts to inoculate Type A and Type B milky disease of Japanese beetle into Chafer grubs of the genus *Schizonycha* were not successful.

At Mwea, blind heads in rice were associated with the incidence of a stem borer, *Rhinophe vectiferella*, recorded in Kenya for the first time.

Control of False Circular Purple Scale was achieved at the Coast by a single spraying of malathion.

Work continued on *Pseudotheraptus* on coco-nuts and a technique for laboratory rearing is being worked out.

In Nyanza, control of cotton pests with a D.D.T./B.H.C. dust gave satisfactory yield increases for the second year in succession. Experiments show that half the potential crop is lost to insects. Cotton Stainers, *Dysdercus* spp., cause the greatest loss.

Good termite control in sugar cane has been obtained by immersion of the setts in weak dieldrin emulsion for 10 minutes. Control of mound-dwelling termites was achieved by pouring dieldrin or aldrin down the ventilation shafts.

The Spiny Caterpillar, *Achræa acerata*, was controlled in sweet potatoes by endrin and chlorthion.

An outbreak of *Trogoderma* in Zanzibar was investigated.

A new maize crib experiment was set up. A large stacked bag experiment, treated on the outside with insecticide, was started.

Ephestia infestations in stores occurred and encouraging results were obtained by the use of pyrethrum/piperonyl butoxide in oil in Microsol machines.

A paper on Ethiopian mealybugs is in the Press. A review of some genera of Coccids was begun. Two papers on species of *Saissetia* have been completed and one is in preparation on the genus *Coccus*. An investigation on the symbiotic flora of some important species of Coccids is being carried out since it may aid in the identification of species which show little structural difference.

Towards the end of the year entomological work on coffee came under the direction of the Senior Research Officer (Entomology). The results of this work are reported in a preceding section under the heading Coffee.

Soil and Agricultural Chemistry

The Chemistry Section was preoccupied with the continued investigation of the suitability of certain lands in Nyanza, Rift Valley, Northern, Central and Coast Provinces for irrigation, and with the laboratory examination of soil samples from these areas. Land use classification maps covering 76,000 acres in the Mwea-Tebere project area were completed. The surveying and sampling of 25,000 acres in the Tana Delta project area were finished. Trials were laid down aimed at assessing the possibility of reclaiming the salted soil of the desert hinterland of the lower Tana river for irrigation.

Lime Studies.—The liming studies begun in 1953 were continued in the field and in the laboratory. Nitrogen, phosphate and potash were applied to all field trials and all were planted to wheat. The Kaptagat wheat yields for 1955 were analysed. Growth failed on plots receiving neither lime nor phosphate. Plots given phosphate only yielded about 200 lb. per acre and those given lime only about 500 lb., while those given both yielded over 1,000 lb. The main blocks indicated a large response to nitrogen and a positive interaction between nitrogen and phosphate.

Eldoret soil samples (taken in January, 1956) were analysed for exchangeable bases. The heavy lime applications raised the pH from 5.1 to 5.3 and the percentage base saturation from 32 to 51. Leaf samples from the 1954 Eldoret wheat crop were analysed for mineral content. The most marked results were the depressing effect of the muriate of potash field application on the calcium and magnesium contents of the leaf, and an increase in the silica content. Thousand-grain-weight values were obtained for three field trials. Phosphate applications resulted in a considerable increase in this weight, potash a smaller increase and lime a variable effect.

Soil Nitrogen Studies.—The effect of additions of calcium carbonate and salt upon the mineralization of soil organic nitrogen was studied in three soils, one from Njoro and two from Kanja, Embu District. Only calcium carbonate significantly affected the rate of mineralization of soil nitrogen.

Fertilizer Trials.—An officer of the Chemistry Section supervised and co-ordinated the work on the large number of fertilizer trials in the African areas reported at the beginning of Part II under the heading General Husbandry.

Problem Soils.—Investigations of the nutrient requirements of problem soils were continued. Five soils from Njoro, Lesirko, Marindas and Kabete (2) were examined by a modified Webb/Hewitt pot-culture technique. Phosphate deficiency has been recorded in all the soils examined and the technique has indicated sulphur, copper, zinc and molybdenum deficiencies in some of the soils. The examination by the same method of six more samples from Kanja, Embu District (2), Subukia, Njoro and Machakos (2), the latter suspected of zinc deficiency, was begun but no results are yet available.

Wheat Baking Quality.—In connexion with the decline in the baking quality of Kenya wheats, an investigation was begun of the relationship existing between protein constitution and dough strength.

Plant Breeding

Cereal breeding continued at Njoro and the associated Departmental Stations at Molo, Ol Joro Orok, Eldoret, Kitale and Rongai.

Wheat Stem Rust.—For the second year in succession, stem rust attack of wheat was severe, particularly in the Trans Nzoia where the crop suffered much damage. The position with regard to races is obscure due to the lack of a pathologist: the recruitment of a new pathologist for rust investigations is eagerly awaited. Regarding wheat varieties, the position has worsened since 1955 in that there are now none in general use which show full field resistance to stem rust: in particular, the new variety 354 just released, which had remained almost free from rust in 1955, was completely destroyed on some farms. Even 321 and Regent, up to now completely rust free, did suffer some damage. Regarding other diseases, yellow rust and glume blotch were more prevalent than usual due probably to the cold and wet weather during July and August. On the other hand "Take all" in the high country was less severe than customary. It is, nevertheless, the limiting factor to wheat production in these areas.

In breeding for rust resistance, continued use is being made of material distributed in the International and F.A.O. Wheat Nurseries. Certain selected varieties are now being multiplied for possible direct issue and others are being used in the crossing programme to widen the genetic basis of Kenya wheats. Plans are in hand to speed up the work by growing several generations each year, and to this end, the Senior Plant Breeder visited Canada and the United States to seek information and advice on the practicability of using growth rooms and other breeding aids in Kenya. The same opportunity was taken to obtain new sources of rust resistance, many of them derived from intergeneric hybrids with related grass species.

New Cereal Varieties.—New varieties released for the 1956 season were the wheats 356.A.2.A., 358.AA.5.B., 362.B.1.E.4, the barleys Carlsberg and Proctor, and the oats Boone and R.L.1734. The variety 362 has become very popular in the high country owing to its heavy yields and resistance to both stem and yellow rusts in these areas. With the declining acreage of wheat due to stem rust, barley has much increased during the past two years and, particularly, the Scandinavian type has shown itself well adapted to Kenya conditions. The British variety, Proctor, seems especially promising and it is hoped will be valuable as a malting variety in this country.

Maize Breeding.—The maize breeding work is in a stage of transition, a reflection of the emphasis now being placed on synthetics as opposed to hybrids. With the appointment of a maize breeder at Kitale, the main breeding effort is being concentrated there and work at Njoro is on a reduced scale. The first synthetic from Njoro has now been released and has given a slightly higher yield than selected station maize; reports from farmers who have grown the synthetic during the season are still awaited. The future of Kitale interim synthetic is more doubtful and it would seem advisable in this case to wait until the first full synthetic has been produced for this area. Work at the Coast on the production of local maizes resistant to tropical maize rust has progressed one stage further and the compounding of bulk material for issue should soon be possible. The arrival of a breeder at Machakos makes feasible the initiation of a programme of breeding work on short-term maizes and sorghums for the drier areas of the Southern Province.

General.—The deterioration in the baking quality of Kenya wheat is still causing concern and co-ordination of field trials was arranged by the Department in collaboration with E.A.A.F.R.O., and Messrs. Unga Limited. Results of the 1955 trials were largely inconclusive due to the wet season and severe rust attack.

With regard to the development of the Plant Breeding Station, no new building work took place during 1956, but plans for the new laboratories to be built in 1957 were completed. Conversion of field boundaries to the new layout proceeded steadily. Staff changes during the year included resignation of the Plant Pathologist, the transfer of the Seeds Officer to the Plant Breeding Services and the recruitment of the new Plant Breeder for Machakos.

PART III—FIELD SERVICES

Progress in Improved Farming

EUROPEAN AREAS

Progress in the Highlands continued during the year. Census figures issued in September, 1956, show an increase in the grass ley acreage of 23,800 acres and the total area under leys is now 79,000 acres. These figures also show that cattle numbers have increased and now total 765,400 head, an increase of 8.3 per cent on the previous year. This increase is evenly spread between beef and dairy herds with a reduction in the numbers of working oxen. Pig numbers have gone up slightly and poultry numbers have declined. While interest is increasing in beef production the monthly milk cheque from the dairy herd remains essential for the provision of working capital. Interest in the production of lamb has increased during the year, and sheep numbers have gone up as a result of an increase in prices. Considerable increases in butterfat production particularly in the Kinangop and Ol Joro Orok areas are evidence of the progressive switch to alternate husbandry in the Highlands.

Financial reinforcement of farm development was provided by development loans administered by the Board of Agriculture with the European Agricultural Settlement Board acting as paying-out agents. During the year 140 farmers took

up loans amounting to £190,566 mainly for the purchase of livestock, the installation of dips, sprays and water supplies and the erection of fencing. The biggest single item in the sum allocated was £116,456 for the purchase of cattle.

Seed Certification.—The seed cleaning plant at Nakuru was closed down at the end of March, 1956, and sold by tender towards the end of the year. Approximately 16,200 lb. of grass and cereal seeds were cleaned during the period January to March. A new scheme administered by the Senior Plant Breeder has now been introduced for the production of pedigree cereal seeds by selected growers who will obtain their mother seed from the Plant Breeding Station and sell the progeny on a free market without control of price.

ASIAN AREAS

The Asian farmers in the Kibos and Muhoroni areas of Nyanza Province continue to make satisfactory profits by selling their cane to the Miwani Mills. During the rainy season when the roads are closed to heavy transport they make jaggery at their own factories. One Asian farm in the area has been surveyed and planned as a demonstration. Growing attention has been paid by these farmers to Soil Conservation.

In the Coast Province numerous small irrigated holdings continued to thrive around Mombasa and along the coast. From the larger estates the produce included sisal, coco-nuts, sugar, and tropical fruits. All the coco-nut plantations showed an improvement in plantation hygiene. A limiting factor to successful production of good quality coir has been *Theraptus* damage and to overcome the knots in the fibre caused by this insect machines have been modified so that wet husks can be used. The husks are soaked for 24 hours in tanks, processed wet and the fibre is then dried and baled.

AFRICAN AREAS

General.—The augmentation of staff and funds provided under the Swynnerton plan with the generous assistance of Her Majesty's Government in the United Kingdom has stimulated a remarkable development of African farming particularly in the areas of high potential.

Nyanza Province.—Farm planning has continued to make considerable progress throughout the Province. Whereas in 1955 North Nyanza District was well ahead in this development, this year Elgon Nyanza has come rapidly ahead with South Nyanza not far behind. In North Nyanza 96 farms were surveyed and 69 planned. In Elgon Nyanza 199 smallholdings were surveyed and 66 planned and in South Nyanza 51 holdings were planned of the 77 surveyed. In Central Nyanza planning was dropped early in the year in order to concentrate on the consolidation of the scattered pieces of cultivation worked by each family. In the African areas of Kericho District planning was confined to the Kimulot and Itembe settlement areas and intermediate school farms where progress was satisfactory.

A promising start has been made on the Nyabondo Plateau and at Odiado in the Samia location of Central Nyanza during the year on the consolidation of holdings. The aim is to reorientate ownership of land so that the scattered pieces of cultivation are scrapped and the individual receives a consolidated area equivalent to the aggregate acreage of land given up. By the end of the year 660 acres of fragments of cultivation had been entered in the Nyabondo Register and 450 acres at Odiado. Propaganda proceeds in these areas as well as in the Maragoli/Bunyori country and in Elgon Nyanza.

The enclosure of holdings is proceeding rapidly all over the Kisii Highlands as well as in the Luo areas in the vicinity of Muhoru where sisal hedges are

being used. In Kericho District the example of the progressive Buret division is being followed in the more backward areas except for Lower Belgut where there is still little response.

In spite, however, of the progress reported above the general standard of farming throughout Nyanza Province remains low. It is still rare to see any farmer building a cattle-shed in which to bed down his stock and produce manure for his arable lands. Weedy and couch-ridden arable and pasture lands thick in bush are still prevalent. There is also a tendency for the farmer to regard farm planning as a measure enabling him to gain title to his holding rather than a means of improving the productivity of his farm. The Province therefore provides a fertile field for education in better farming.

Only one district in the Province, Elgon Nyanza continues the "Rewards for Good Husbandry" scheme. During 1956 awards to 138 farmers to a value of £1,217 were made. It is now generally thought that offering the facility of loan money to the farmer who wishes to improve his farm is more likely to induce a sense of responsibility. The demand for such loans grows apace. All districts, except Kericho, have applied for Government funds to finance such loans. Kericho District is financing loans from African District Council funds. In this district a Loans Board has been set up with an executive office to administer funds lent for better farming and for water supply development.

In Kericho District a further ten tractors were purchased by Africans, bringing the total in the district to 30. The present rate for ploughing is Sh. 55 per acre for a well-known make of light tractor. The standard of land preparation by these tractors tends to be extremely low, the drivers generally doing a slipshod and untidy job. There is also one tractor operating near Oyani in South Nyanza.

The use of fertilizers is taking on in North and Elgon Nyanza. One Elgon Nyanza farmer bought 20 tons of phosphate through the local Co-operative Society and as a result now says that he cannot afford to do without it. Indications are that consumption will now increase progressively.

Rift Valley Province.—In the areas of high potential enclosure proceeds apace. A special tribunal has been set up in Elgeyo to deal with boundary claims reflecting the interest shown in this movement. The idea of simple rotational farming is impressing itself on the cultivator. In Elgeyo 3,500 acres have been planned on a conservation layout and seven leys have actually been established by local African farmers. Pyrethrum has also been established as a cash-crop incentive for planned farmers. In Nandi District more farms have been surveyed and planned and in the Ndalat area following on the development of the skeleton layout of contour ridges a pipeline has been laid which will serve over 2,000 acres.

In Baringo the 9,000 acres in Kabimoi which were surveyed last year have now been laid out into holdings of approximately 100 acres each and every landowner has a rough farm plan. Similar work has now started at Chemagoch.

In West Suk 17 smallholdings have been developed on a planned basis. The erection of fencing, the making of silage and the growing of pyrethrum is an integral part of this farm planning. A further 2,000 acres has been surveyed at Chepararia for planned holdings.

Central Province.—The year has seen a relaxation of Emergency conditions and much progress in the field. The Kikuyu districts have been heavily involved in the process of recording and measuring innumerable land fragments preliminary to demarcation of consolidated farms. In Meru and Embu where fragment gathering is not the major factor it has been possible to make a large-scale start

on improved farming and farm planning through settlement and the return of farmers on to pilot consolidated areas. A total of 187,883 acres has been covered in the process of fragment measuring and a total of 32,626 acres demarcated in all districts of the Province.

It became apparent during the year that following demarcation of the new holdings there was a need for an immediate follow-up in better farming applied to all the farmers concerned. This is not possible to attain by detailed farm planning but needs a simple approach that can be implemented by junior African staff and which will run parallel to the farm planning service. The need for this has been underlined by the knowledge that refragmentation of consolidated holdings is an existing danger even in the first pilot areas where land consolidation was carried out. This danger can be overcome by demonstrating to as many people as possible that to have their land in one piece is an economic advantage and this in turn can be shown by getting as many as possible on to reasonably sound farming practices and with one of the currently high-priced cash crops on their holdings.

Detailed farm planning has made good progress during the year and 253 farms were dealt with. The biggest limitation to the general progress in improved farming in the Province is the necessary enforcement of the law which obliges people to live in villages. This hinders the introduction of improved livestock which can only be kept clear of disease when kept on the holdings of individuals and not subject to infection in village cattle-sheds.

The large-scale soil conservation measures made possible by the employment of large numbers of Kikuyu relief gangs and the use of large quantities of communal labour during the Emergency came to an end in 1956. Much work has, however, been carried out as a routine part of extension duties in all districts.

Southern Province.—Heartening progress was made throughout the Province. An enormous amount of bench terracing has been done throughout Machakos District and the use of manure is becoming increasingly popular. It is probably true to say that over 70 per cent of the people in the high potential areas use manure with striking results whereas in the semi-arid areas it may be as low as 2 per cent of farmers. A feature of the high potential areas in the hill masses is the building of cattle-sheds by farmers, often of a high standard. In spite of tremendous achievements in the restoration of a grass cover on eroded grazing areas in Machakos District it is still a fact that whereas improvement in the arable lands has become firmly established, the control of stock, stock management and pasture management does lag behind. Every effort has been made to effect rotational grazing in Machakos although hindered by drought during the year. The value of Napier grass planted in river beds was realized when drought destroyed the grazing.

Outstanding work has been achieved in Kitui District where the attempt to balance stock numbers with the available grazing by adequate stock sales has been accompanied by a remarkably successful campaign to restore the grazing in the eroded areas. The Kitui Wakamba have been encouraged to re-establish grazing through the medium of scratch ploughing and seeding grass. At the same time grazing areas have been extended by the clearing and burning of bush. One Chief alone ordered 300 ploughs on behalf of his people for the main purpose of scratch ploughing. In the words of the Acting Assistant Director in charge of the Province—"that these ploughs have been used for the purpose for which they were bought is quickly seen by a visit to Kitui". Each Locational Council has opted to clear one square mile of bush by means of communal labour each year and is doing it. Thirty-nine thousand four hundred and seventy-three acres were closed to grazing during the year for restoration, 61,472 acres were cleared

of bush and 28,871 acres were regrassed. In addition, over 37,000 acres of cultivated land were protected by trash lines and 1,080 acres by means of live wash stops.

Progress in Masai was limited but there is now a demand for farm planning in the Ngong area and a few farms have been planned in the Trans Mara. The Nairage Ngare settlement progressed slowly owing to inadequate water supplies.

Coast Province.—There is evidence at last that in at least one district of the Province this department is being regarded rather less as an instrument to enforce legislation and people are beginning to come forward with requests for their land to be surveyed and planned. In the Kaloleni and Rabai division there are now nine holdings in various stages of planning. The propaganda drive to improve the standard of cotton cultivation with the active help of the Department of Information resulted in an all-round improvement in cultural practice and the economic use of seed. The coco-nut improvement scheme continued in Kilifi and Kwale Districts. The aim is a general improvement in this valuable crop by the elimination of dead, senile and unproductive palms; gapping and extension with improved seedlings: reduction of bush undergrowth, in particular *Lantana camara*, with the resultant cleaner plantation and reduced pests. Over 12 square miles have so far been treated.

Reconditioning, Resettlement and Development Schemes

The progress of schemes with which this Department was particularly concerned is described below.

NYANZA PROVINCE

Lambwe Valley.—New settlement has been disappointing and some settlers have left the valley to return to their homes, having heard rumours that land consolidation was going to be enforced there. It has been decided that should the response by South Nyanza people not be satisfactory by the new year the valley will be opened to settlement by others districts. Progress on individual holdings has been good.

Kimulot Scheme.—Thirty unsatisfactory settlers have been removed and replaced and a further 20 farms which were not being properly developed have been split into two. Farm planning is going ahead and hedges and homesteads have been established. Over 100 farmers will be ready to plant tea in the long rains of 1957.

Chepalungu Scheme.—Development of the experimental farm at Kabossan continued.

Itembe Scheme.—Three hundred and seventeen plots of approximately 30 acres have been surveyed and adequate land for public purposes has been set aside. By the end of the year 173 plots had been occupied by settlers and enclosure of the holdings is proceeding. Four dams were completed by the Lumbwa Soil Conservation Unit thus creating an adequate water supply for the scheme.

Kibos-Awach Scheme.—Steady progress was made with this conservation scheme, 275 miles of terracing and other works having been completed during the year. The local people have expressed a desire that tree planting should be carried out on steep and rocky slopes closed to cultivation.

CENTRAL PROVINCE

Kibirichia Ruiru Scheme.—This is a resettlement scheme in Meru District. Altogether 285 farms have now been laid out and occupied and are being developed on a planned basis. In the water scheme associated with the settlement 12 miles of furrow have been completed including the first of the water storage

tanks. Co-operative marketing of potatoes from this scheme went satisfactorily and great benefit was derived by members from an extended credit system whereby 200 members received about £2,000-worth of goods in the form of cedar fencing posts and wire for the development of their holdings.

Mutuntu Settlement Scheme.—This is in Meru District. One hundred and twenty-seven farms covering 1,900 acres have been laid out and are being developed.

Thuura-Nkabune Scheme.—This is a fly-clearance scheme to be followed by settlement. Six farms comprising 120 acres have so far been marked on the ground.

Embu Settlement Scheme.—This scheme now has 75 settlers of which 60 have planned farms. This settlement scheme is designed for the use of Kikuyu Ahoi although there are some genuine Embu residents on a proportion of the farms.

Kanja Pilot Dairy Scheme.—This comprises a small number of planned farms in the High Bracken zone of Embu District. These have progressed very satisfactorily during the year. Crops of maize, beans and millets grown directly under our advice have produced yields far in excess of those normally obtained by African cultivators in the area. Corriedale sheep have been introduced and pyrethrum flowerings from long rains plantings have been good. This scheme has provided much useful information applicable to the High Bracken zone as a whole.

Ishiara.—There are now 36 farmers settled on this irrigation scheme. A total of 82 acres is under irrigation including an 8-acre demonstration plot. Good crops were taken in 1956. The success of this small scheme points the way for further similar developments in the hot, low country of Embu District.

SOUTHERN PROVINCE

Machakos District Reconditioning Scheme.—The extension side of this scheme covering the whole reserve has continued to operate satisfactorily. The reconditioning, however, has been slowed down by unfavourable weather and the reduction of communal effort to one day per week. *Mwethia* or self-help groups have gone some way towards replacing communal effort. Development of better farming and the establishment of cash crops continued through the year, and the progress has amply repaid the services of the African staff paid from the Machakos Betterment Scheme funds. The Survey Unit completed the survey of the second area to be selected for special mechanical treatment. The machines moved in early in the year and have completed 15 miles of cut-off drains, a large dam, over 80 miles of terraces and 23 miles of roads.

Makueni Settlement Scheme.—Great progress has been made during the year on bush clearing and stumping, a total of 7,000 acres having been treated. There are now 1,604 settlers in the scheme with room for possibly another 700. Excellent crops were reaped from the 1955/56 short rains which carried the people through the year in spite of the failure of long rains plantings.

Kamba Grazing Areas.—These areas comprise the Yatta Plateau, Simba-Emali, L.R. 7048 and the Lower Makueni Grazing Scheme and are being developed as ranches mainly under Veterinary control.

COAST PROVINCE

Gedi Settlement Scheme.—This settlement which started as long ago as 1934 is well established and sets a standard of agriculture far ahead of the surrounding area. At the end of the year settlers numbered 532 and the total population 2,860.

Excellent long rains in this area ensured a plentiful food supply and 400 tons of maize were harvested. During the long rains 12,000 coco-nut seedlings and over 15,000 kapok seedlings were issued to settlers. The cash return in 1956, excluding the sale of castor seed, chicken and coco-nuts, was £14,000 from the sale of cotton and £3,300 from the sale of cashew nuts. The return from cashew nuts and cotton to the settler averages £32 a year.

Shimba Hills.—The total number of holdings now occupied is 82. The survey and marking of farm boundaries was completed early in the year. Terrace lines, covering four acres per holding were marked out and the area stumped. This gave the settlers their initial four acres for cultivation. Good harvests were obtained, thus helping to establish this settlement.

RIFT VALLEY PROVINCE

Riwa Grazing Scheme.—This was extended to the east and west during the year and the total area now under control is 40,000 acres. A noticeable improvement in the grass cover is proving the worth of such schemes to the West Suk people with the result that a further similar scheme has been established in an area of 43,000 acres at Kipkema and another block of 30,000 acres at Batei has been set aside for similar treatment.

Esageri-Kisokon Ranching Area.—This is an area of some 26,000 acres in South Baringo which is being grazed on a four-block rotation with the cattle in each block for four months. The area is carrying some 2,500 head of native cattle. Regeneration of grass in the formerly eroded area has been good but bush control requires attention.

Sarora Settlement.—There are now 163 families in this settlement scheme in Nandi District. The whole area has been protected by cut-off drains and the holdings are being farmed on a rotation.

Kaimosi Settlement.—Seventy-two holdings have been laid out for settlement and a piped water supply installed. Forty-five settlers are established.

Perkerra Catchment Area.—The serious erosion problem in this area requires urgent attention and plans have been drawn up so that a start can be made early in 1957 on grazing control and revegetation of denuded areas.

Soil and Water Conservation

SOIL CONSERVATION ENGINEER'S HEADQUARTERS

The Senior Soil Conservation Engineer again had a busy year guiding field staff in both the European and African areas on the technical aspects of soil conservation, drainage and dam construction. Visits were made to tea estates, sugar estates, individual farmers, the Itembe Settlement Scheme, Machakos Betterment area and other districts.

Workshops.—The Field Transport Officer continued to be based on the "Agron" workshops at Nakuru and his work has resulted in an all-round improvement in the maintenance of vehicles. The work of the Central Workshops at Nakuru is listed below:—

Rift Valley Province: 94 jobs of which 20 per cent were major overhauls.

Nyanza Province: 14 jobs all complete overhauls.

Central Province: 8 jobs all complete overhauls.

Coast Province: 5 jobs all complete overhauls.

Southern Province: 1 complete overhaul.

Experimental and other stations: 104 jobs of which 20 per cent were major overhauls.

Dam Construction Units: 12 jobs of which one was a complete overhaul.

ALDEV vehicles: 15 jobs.

Other jobs included the assembly of two heavy excavators, assembly and servicing of 8 new Land-rovers, the building of 3 new caravans and the rebuilding of 2 others, the overhauling of 5 Land-rovers completely, and the overhauling of 4 tractors. The total number of jobs completed was 277. In addition, repairs and maintenance were carried out in the field on Nakuru and Lumbwa Soil Conservation Unit equipment.

The service station at Nyeri has done a very good job in maintaining the Central Province vehicles. The service station at Kisii was opened at the beginning of the year and this has proved to be a great asset to the Department in maintaining vehicles and carrying out minor repairs to vehicles stationed in the area.

SOIL CONSERVATION—EUROPEAN AREAS

Terracing.—The area of farmlands protected against erosion in 1956 was 37,720 acres compared with 27,094 acres in 1955. The area protected by diversion ditches has doubled whereas the area terraced has declined from 12,332 acres to 7,670 acres. The total area of farmland protected against erosion by the Department's mechanical units has now reached 243,975 acres plus the 5,572 acres treated in the Nandi and Elgeyo reserves this year. The five units in the Rift Valley Province achieved 31,733 hours, a very good performance with 25 tractors operating in the field thus achieving an average of over 1,200 hours per tractor. The two tractors of the Lumbwa unit achieved 1,890 hours of work in spite of very wet conditions and major overhauls. The performance of the Ruiru unit of two tractors was only 947 hours but this is as much as anything a reflection of the extent to which estates in the area do their own work.

Comparative figures of work done are set out below, and details for 1956 are given in Table E.

ACREAGES PROTECTED BY SOIL CONSERVATION MEASURES

District	1941-53	1954	1955	1956	Total
Trans Nzoia	40,153	5,213	4,047	9,412	58,825
Uasin Gishu	30,506	8,937	9,212	8,355	57,010
Nakuru	47,417	4,727	5,292	5,800	53,236
Thomson's Falls ..	27,738	3,862	4,175	8,213	43,988
South Kinangop ..	—	3,772	3,212	4,922	11,906
Nyanza	7,529	866	179	579	9,153
Nairobi	3,872	141	977	439	5,429
TOTAL	157,215	27,518	27,094	37,720	249,547

Permanent Crops.—In the Nyanza and Nairobi areas much of the cultivated land is taken up by permanent crops such as tea in Nyanza and coffee, sisal and pineapples in Nairobi District. Work was carried out during the year on various tea estates at Kericho and smaller terraces at closer intervals are being tried. Three hundred and fifty-five acres of tea were terraced during the year. In the Nairobi District a total of 188 acres was set out for contour planting of coffee, 1,675 acres of sisal and 50 acres of pineapples. In addition it is estimated that about 1,000 acres of sisal was set on the contour by planters themselves. The acreage of permanent crops known to be protected by suitable soil conservation measures is shown below:—

SOIL CONSERVATION IN PERMANENT CROPS (ACRES)

Crop	1941-53	1954	1955	1956	Total
Sisal	4,595	1,416	2,200	1,675	9,886
Wattle	4,556	—	—	—	4,556
Tea	4,045	275	—	355	4,675
Coffee	1,048	140	151	188	1,527
New Zealand Flax ..	999	—	—	—	999
Total Acres ..	15,243	1,831	2,351	2,218	21,643

Farm Planning.—There has been a very heavy demand for this service in the Rift Valley Province during the year and districts have been unable to deal with all farmers' requests. During the year nearly 38,000 acres representing 29 farms have been dealt with compared with 19 farms covering 21,642 acres in 1955. Particulars of the work done are best illustrated by the following table:—

FARM PLANNING, 1956

District	Farms Surveyed and Mapped		Farms Planned	
	No.	Acres	No.	Acres
Nakuru	11	21,735	10	10,035
Uasin Gishu	12	13,219	12	11,778
Trans Nzoia	8	6,787	3	2,463
Thomson's Falls	11	19,200	4	13,700
Nyanza	5	10,986	3	7,073
Nairobi	3	1,578	1	140
	50	73,505	33	45,189

The total acreage now planned is:—

	Acres
Nairobi District	6,345
Nyanza District	11,373
Rift Valley Province	112,442
Total	130,160

TABLE E.—SOIL CONSERVATION SERVICE—EUROPEAN AREAS—OUTPUT OF TERRACING, ETC., FOR YEAR 1956

DISTRICT	No. of Farms Treated by Tractor	ACREAGE PROTECTED BY				Total	COMPLEMENTARY WORKS						
		Broad Base & V Terraces	Diversion Ditches	Narrow Base Terraces	Bench Terraces		Roads	Excava- tion	Training Banks	Outlet Drains	Cut-off Drains	Small Dams	Camber Beds
							<i>Yards</i>	<i>Cubic ft.</i>	<i>Yards</i>	<i>Yards</i>	<i>Yards</i>	<i>Cubic yds.</i>	<i>Acres</i>
Trans Nzoia	52	1,960	7,452	—	—	9,412	54,147	127,100	11,279	3,950	19,813	22,600	
Uasin Gishu	43	1,962	6,393*	—	—	8,355	68,931*	—	1,876	4,465	8,012	59,721	
Nakuru	58	2,084	3,511	188	17	5,800	139,700	—	27,968	1,616	51,815	26,110	
Thomson's Falls	30	100	8,113	—	—	8,213	43,941	337,541	22,500	10,218	5,574	37,730	
S. Kinangop	20	590	4,280	50	2	4,922	52,892	135,000	3,763	1,000	—	100	
Lumbwa	12	555	—	25	—	579	10,754	600	—	2,746	—	14,560	
Nairobi	7	419	—	15	5	439	11,072	7,000	85	2,769	4,600	5,745	147
	222	7,670	29,749	278	24	37,720	381,437	607,241	67,471	26,764	89,914	186,466†	147

*Includes 5,572 acres and 8½ miles of road in Nandi and Elgeyo.

†Includes 55,320 cubic yards in African areas.

Dam Construction.—The seven soil conservation units constructed a total of 40 dams and waterholes during the year. Twelve of these were constructed in the reserves, four on the Itembe Settlement Scheme and the rest were on farms.

Soil Conservation Finance.—Charges to farmers for soil conservation were increased in September to cover increased operating costs. Half of the cost of the operational service is met by Government and half is recoverable by charges to farmers. Advisory services are financed entirely by Government. The revenue obtained from this service continued at the same level as last year but a small increase is anticipated in 1957. The non-payment of outstanding debts by a small minority of farmers continued to be an embarrassment but there was only one "court" case during the year.

Land Preservation Orders.—The Director of Agriculture issued 24 Orders under the Agriculture Ordinance in 1956 of which 19 were cancellations of previous Orders and the rest required either the closure of eroded land or terrace protection works. The Land Preservation (Scheduled Areas) Rules, 1956, were issued on 31st October, 1956, requiring the Director of Agriculture to obtain the approval of the Agricultural Sub-Committee of the area concerned before issuing an Order. This is a measure of the increased responsibility for the future well-being of the European farming areas now being assumed by the Agricultural Sub-Committees administered through the Board of Agriculture. These rules have been greatly simplified, no mean achievement in these days when the trend of legislation is towards increasing complication. The essential powers to deal with serious soil erosion have however been retained. With increasing responsibility for the conservation of the Highlands devolving upon the farming community the Soil Conservation Inspectors have been largely switched to operational duties although it has been necessary in some areas, particularly the Kericho and Nairobi Districts, to retain the services of River Scouts. Nineteen River Scouts supervised squatter cultivation in the Kericho District. In the Nairobi District River Scouts laid out 452 miles of narrow-base terraces in African cultivations on European estates. Such cultivation has increased, particularly where squatter stock has been reduced or removed. The Inspector for this area visited 164 farms in 1956 apart from operational duties.

SOIL CONSERVATION—AFRICAN AREAS

Nyanza Province.—The soil conservation situation in this Province is reasonably satisfactory except in the Luo areas of Central Nyanza and the lake shore area of South Nyanza. In Central Nyanza a satisfactory amount of soil conservation work was nevertheless achieved, over 17,000 acres being protected by grass strips and 6,333 acres by terraces. Other work included 3,696 acres protected by wash stops and it is estimated that just over 30 per cent of existing cultivation is now protected. There is still a tendency on the part of the people in this district to plough out and destroy grass strips with the local authority reluctant to take responsible action to stop the nonsense. In North Nyanza there has been much better progress in the Southern Division during the year and the system of measuring complete valleys and issuing warning notices to individual landowners has had satisfactory results. Three thousand, nine hundred and fifty-two miles of grass strips were marked out, 3,600 miles of terraces and 1,100 miles of other works such as bench terraces and reverse terraces. Grass strips are used on slopes up to 8 per cent, terracing on slopes up to 20 per cent and bench terraces on steeper slopes over 20 per cent. In the Kisii Highlands soil conservation by grass strips is carried out in all cultivations and progress in the difficult lake shore area is represented by the protection of about 60 per cent of the cultivated area by means of grass strips. In Elgon Nyanza the measuring of grass strips continued in all areas and in general soil conservation in most areas was adequate. In the

Kericho Reserve the extensive enclosure with live hedges holds the countryside together most effectively and soil erosion is no problem. Arable lands are protected by grass strips. Cattle tracks leading down to watering points on streams and swamps do, however, erode badly and the problem is being tackled, albeit slowly, by installing water supplies on individual holdings.

Rift Valley Province.—Adequate conservation measures exist in the cultivated lands and totally inadequate measures in the semi-arid grazing areas. Work in the semi-arid areas is being stepped up by means of the grazing control scheme previously described. Some 40 miles of diversion ditches have been constructed in Elgeyo and general narrow-base terracing has been extended in the Baringo District. The need for good husbandry to conserve the soil as well as plain earth moving has been emphasized in all this work. About 4,000 tree seedlings were issued for planting in Elgeyo.

Central Province.—The employment of Kikuyu repatriates and the use of large gangs of communal labour came to an end in 1956. The extension staff of the Department however achieved an appreciable amount of new terracing during the year. Two thousand, nine hundred and thirty-seven cattle-sheds were built in Embu District, 160 in Meru, 538 in Kiambu, 25 in Fort Hall and 303 in Nyeri District. The position in this Province is that 50 per cent of cultivation is now protected by conservation works.

Southern Province.—There was a reduction in the amount of narrow-base terracing done but a compensating increase in the amount of bench terracing. In all 12,703 acres of cultivation were protected by 2,337 miles of terraces and 8,737 acres were protected by the construction of 1,498 miles of bench terraces. Over 7,000 miles of trash lines and live wash stops were also laid in Machakos and Kitui Districts. Extensive areas in these two districts were closed to grazing to restore the grass cover, cleared of useless bush and planted to grass. Five thousand five hundred and eighty-eight cattle-sheds were constructed.

The mechanical unit in Machakos District constructed two large dams with a combined capacity of 90,000,000 gallons as well as 15 miles of cut-off drains, 83½ miles of terraces and 22¼ miles of roads. The construction of small dams in Kitui District by communal effort continued and in addition two sub-surface dams were installed on the Mwita Siano in Kitui District.

Coast Province.—Arable lands in the coastal district are protected by trash lines. Over 2,800 acres were so treated during the year. Prosecutions for disturbing trash lines have effectively stabilized the situation resulting in a better build-up of soil behind the trash lines. In the Teita Hills ridge cultivation is being encouraged and more bench terracing has been done. In all, 13,829 acres were protected by means of contour works during the year in these hills. In the Kwale District an area of some 90 square miles was closed to grazing in the Mazeras/Mariakani area and the cattle accepted within the Vigurungani grazing area, now an African District Council grazing control project. About one-third of the cattle have moved into this area and the rest have scattered to avoid control in any measure. Other work in the Province included the construction of three dams and the closure of individual cultivations on very steep slopes.

WATER CONSERVATION—MECHANICAL DAM CONSTRUCTION UNITS

The work of the three heavy Dam Construction Units continued to be the responsibility of the Engineer's Section of the Soil Conservation Service which section also guides the work of the seven District Soil Conservation Units administered by the Provinces. A total of 47 dams, a few of which were only small waterholes were completed by all units during the year. The water storage capacity created by the year's work amounted to 592,000,000 gallons compared

with 906,000,000 gallons in the previous year. In addition, 128,212 cubic yards of earth were moved by No. 1 D.C.U. on other works not connected with dam construction. Details of the work done are given in the following table:—

DAM CONSTRUCTION—1956

Unit	No. of Dams	Earth Moved	Water Storage	Cost per Cubic Yd.	Tractor Hours Worked	Mean Out- put per Tractor hr.
		<i>Cubic Yd.</i>	<i>Mill. gal.</i>	<i>Sh.</i>		<i>Cubic Yd.</i>
HEAVY UNITS—						
No. 1 D.C.U.	5	340,586	369.0	1.80	7,829	43.5
No. 2 D.C.U.	3	126,768	43.0	1.98	3,341	38.0
No. 3 (Nyanza) D.C.U.	—	102,512	—	0.96	1,951	52.5
S.C.S. UNITS—						
Eldoret	13	59,721	86.0	—	2,398	25.0
Thomson's Falls ..	5	57,730	52.5	—	1,708	33.8
Kitale	10	22,600	7.4	—	785	28.8
Nakuru	7	26,110	24.0	—	728	35.8
Ruiru	1	5,745	2.0	2.46	186	30.8
Lumbwa	3	14,560	8.0	1.81	440	33.0
South Kinangop ..	—	—	—	—	—	—
TOTAL	47	756,333	591.9	—	19,366	35.7

No. 1 Dam Construction Unit spent the greater part of the year in Kitui District, moving to Thika District in November. Four dams were completed in Kitui District including reconstruction work on the two dams breached by exceptional rainfall last year. In July and part of August the Unit was transferred to Hola to assist in irrigation excavation work there. In November work commenced on a large dam on Kianzabe Estates. The No. 2 Dam Construction Unit worked in South Nyanza throughout the year but staff difficulties hindered the work of this Unit and only three dams were completed. By the end of the year changes in staff had produced a real improvement in the operation of this Unit. The No. 3 Dam Construction Unit constructed the stadium at Bungoma and was then laid up for disposal as future demand for large dams in the Colony does not appear to justify the retention of three Units.

Dam Construction Finance.—The charge for work by the Heavy Dam Construction Units was raised to Sh. 138 per tractor-hour during the year to cover increased costs of fuel, labour, spares and materials. Accounts outstanding at the end of the year were considerably reduced.

WATER SUPPLIES—AFRICAN AREAS

Nyanza Province.—Only three large dams were built in Nyanza Province in 1956 by the Mechanical Dam Construction Units. The maintenance of dams in Central Nyanza was satisfactory, grass being planted on dam walls. Little progress was however made in the provision of watering troughs for cattle and watering points for human consumption with the result that much contamination of the water took place and an increase in Bilharzia infection. As a result of the extensive enclosure of holdings in Kericho District thatching grass is in short supply and more and more people are putting on tin roofing which is being used to catch rain water. The general view in this Province is that due to the favourable rainfall as compared with other areas the immediate need is for a large number of small inexpensive dams rather than the large expensive reservoirs constructed by the Heavy Units.

Rift Valley Province.—Twelve small dams and waterholes were constructed by district Soil Conservation Units. The main effort was however directed towards the piping of existing streams in order to reduce the concentration of cattle. The general protection of existing dams throughout the Province is excellent.

Southern Province.—The Kitui District team have been showing much ingenuity in creating water supplies in their arid district and the range of work includes orthodox earth dams, weirs, sub-surface dams, rock catchment tanks, concrete dams and piped water supplies. New supplies have been created at 41 centres. In Machakos District three small dams have been constructed on the Yatta, two in Nzau and one at Mulala. Two sub-surface dams were constructed on the Mwitia Siano and two have come into operation at Makueni. The Mechanical Unit of the Machakos Betterment Scheme constructed two large dams, one at Koi and the other at Kinze.

Coast Province.—In Kwale District one new dam was constructed, three were repaired, two cleaned out and six fenced. In Kilifi District two new dams were built and three old ones repaired.

FIELD DRAINAGE

The Senior Soil Conservation Engineer visited farms at Kitale, Lumbwa, Ol Joro Orok and on the Kinangop in connexion with drainage problems. A communal drainage scheme for the Endebess area of the Trans Nzoia was drawn up but involved very little mechanical work by the Soil Conservation Unit, only about five miles of ditches being required. It was found that ridge and furrow ploughing carried out by the farmers themselves was sufficient to drain most of the land.

In the Ruiru area interest in the cambered-bed system of utilizing *vleis* has increased. Approximately 147 acres of camber beds were constructed by the Nairobi Soil Conservation Unit and demands for new work now amount to about 800 acres. The procedure is that the land is carefully mapped with close interval contours and blocks of what is really large ridge and furrow are set out. The ridges for pineapples are 26 feet from the centre of one furrow to the next and 24 inches high. After the first gathering ploughing for a ridge the ground is ripped to about 18 inches with a ripper to open up the hard compacted black cotton soil. The ridge is then gathered to a height of two feet above the furrows. Up to 15 camber beds are grouped within a raised roadway in blocks, there being a single two-foot outlet culvert to each block which can control run-off water if it should become excessive for the area concerned. In this way the whole area for pineapples is intersected by roads with each drainage block on its own discharging into the main drainage channels which lead to natural drainage lines in the area. In the development of *vleis* in this way the co-operation of neighbouring landowners in the acceptance of draining water is essential and this has not been forthcoming in every case. The cost of this work has been shown to vary with the length of beds that can be put in as shown in the following figures produced by the Nairobi District Soil Conservation Unit.

<i>Beds</i>				<i>Cost per acre</i>	
<i>Length in feet</i>				<i>Sh.</i>	
800	to	1,000		90	
400	..	..		130	
200	..	..		180	
100	..	..		300	

All the beds were 26 feet wide centre to centre of the furrows and 24 inches high. The figures show that it is important to have an economic length of furrow to save frequent turning of the tractors which adds greatly to the cost. Under average conditions a camber bed layout costs about Sh. 140 per acre.

The mole draining trial at Londiani is still standing up well in its sixth season. The experimental area where there are 24 foot strips of moled and unmoled land with the moles at six feet, the average yields in 1956 were 5.22 bags of wheat per acre on the moled plots and 4.39 bags per acre on the unmoled plots. All the plots were planted on the same day and no advantage was therefore taken of the fact that it is possible to plant moled land much earlier, thereby usually obtaining better weather conditions for an increased crop. The indications are that moles will probably last in this area up to seven years.

A small area of 25 acres at Ol Joro Orok experimental farm was tile drained with a skeleton at a system cost of £6 per acre, while on the Kinangop bad weather conditions prevented any large-scale drainage experiments. A small area was, however, mole-drained at a total cost of £5 per acre. It was found that extra expense had to be incurred in levelling anthills in order to get a level run for the moles and it is considered that this method of drainage is not satisfactory on the Kinangop soils which overlie a compact murram subsoil as the moles do not last and the cost is uneconomic.

On the flat Kinangop land diversion ditches on their own are only partially effective and where work is still carried on by farmers following the contour water is in some cases actually held up by contour ploughing. Farmers have been advised that ploughing on a 1 per cent slope or the maximum slope available up to 1 per cent should be practised between the diversion ditches but in many cases this has not been done and in some cases ridge and furrow ploughing has not been carried out as arranged. There appears to be a tendency to think erroneously that the cut-off drains are all that they require for drainage.

The Lumbwa Soil Conservation Unit carried out terracing work on some 200 acres of wet *vlei* land at Sotik with the terraces at approximately 100 feet apart and the terrace grades on 1 per cent and 1½ per cent. It appears that this has been successful on this particular type of soil in providing surface drainage and crop yields have been satisfactory.

Irrigation

The General Manager, Irrigation Development Projects, reports as follows:—

“Although the period under review may not show such a large area to have been developed as was originally envisaged, nevertheless, considerable progress has been made during the year. Two factors in particular have led to this slow-down in the rate of development, the first, and by far the most cogent, being the poor quality of detainee labour and its ever-dwindling numbers and, secondly, on Tebere the difficulty of finding a suitable irrigation layout for the varying slopes on the red soils. It is now hoped that by the use of machinery it will be possible to cut down considerably on the slow and costly field preparation which, to date, has been done by hand as it was the policy to employ all detainees on this type of work. With the use of machines, the development work should now push ahead much more quickly and good progress should be made during the coming year.

At *Mwea-Tebere* it has only been possible to complete some 300 acres of the proposed 500-acre pilot scheme. Most of this is on the black soil where the irrigation layout has been comparatively easy. The main crop on this type of soil has been rice and an average crop should be obtained. Experimental plots of American type and Sudan cottons were also tried and have done reasonably well. In the short rains some 30 acres of Michigan Pea Bean have been grown successfully as well as trial plots of gram, lupin and velvet bean. On the red soils, the extreme porosity of the soil and the difficult slopes which are encountered have proved a real headache and progress has

been very slow indeed. It would appear that the best solution is to level the land first and then use a form of basin irrigation. On these red soils some ten acres of tomatoes have been grown for sale to Kenya Cannery and there are also plots of groundnuts and both American type and Sudan cottons; all are doing well but the cottons, particularly the American types, have suffered damage from insect pests.

During the coming year it is intended to extend the main area to 4,000 acres and to make a start with settling tenants on the land. On the Nguka Swamp, the area reclaimed and cultivated is now 280 acres. A crop of rice was harvested from this area during the first quarter of the year and brought in a revenue of some £7,000. The whole area has been grown to rice again this season. There are also ten acres of tomatoes which are growing well. An experimental plot of "Kenaf" (*Hibiscus cannabinus*) has given excellent results. On this area, too, it is intended to try out tenant cultivators during the coming season.

At *Perkerra* by the end of the year, some 1,000 acres had been prepared for irrigation and of these 835 were sown to crops during the period under review. Maize and groundnuts have been the main crops and good yields have been obtained from each. Sixty acres of tomatoes have been grown for sale to Kabazi Cannery and it is hoped to increase this area to 200 acres in future. Four acres have also been laid out for a grass and grazing experiment. An area of Michigan Pea Bean has also been sown and promises a satisfactory yield. On the experimental plots, citrus, onions and "Kenaf" (*Hibiscus cannabinus*) all show much promise. During the coming season, it is intended to increase the area of the scheme to about 1,500 acres, using machinery for levelling the land. A start will be made with putting tenant cultivators on the land.

At *Hola* the elaborate experimental reclamation plots devised by the Soil Chemist and Hydraulic Department, P.W.D., have been completed and watering has been in progress for some time on the grey soil desert plot and will shortly commence on the red soil too. Leaching on the grey soil plot as was expected, has not been good. Meanwhile, other smaller experimental plots were laid out by the Chief Research Officer on both types of soil and were sown to various crops. Cotton, maize, lucerne, groundnuts, sorghum, sunflower and cowpea have all done most satisfactorily, particularly on the red soil. Smaller leaching experiments on both types of soil are being tried out and on the red soil in particular appear to be promising. It is intended to extend the area of experimentation to some 20 acres during the coming season. Work was started on the left bank experimental plot and was progressing well but, unfortunately, the exceptionally high floods at the end of April broke the containing bund and completely inundated the whole plot. Since then, no further work has been done there as all available labour has been concentrated on the right bank desert soil plots.

At *Lodwar* a preliminary soil survey shows the soils to be very saline and also full of sand lenses and thus likely to prove unsuitable for the type of flood irrigation which is the only one possible. However, before taking a final decision on this scheme it has been strongly recommended that a very detailed survey should be carried out by Messrs. Hunting Aero-Surveys Ltd., who are expert in such matters.

In *Nyanza* the final report on the Kano Plains project is still awaited from Sir Alexander Gibb and Company. The interim reports have already been received and from there it would appear that approximately 30,000 acres could be irrigated. An attempt to obtain some 50 acres for setting up an experimental station at Ahero is meeting with opposition from the local Luo,

who are unwilling to give up the land although in favour of having the experimental station.

The *Yatta Furrow* has been pushed ahead and it is intended to complete this 40-mile furrow during the coming season. As yet, no irrigation scheme has been laid out and the water will be used for extending the grazing areas which was always its primary object.

At *Taveta* small irrigation schemes at Kitoro and Kimorigo are proceeding and appear very promising although the danger from bracken must always be carefully watched in this area."

Agricultural Education

THE TRAINING OF AGRICULTURAL INSTRUCTORS

Particulars of the instructors trained at the centres in 1956 are given below:—

<i>Two-year Course</i>							
<i>Province</i>					<i>1st Year</i>	<i>2nd Year</i>	<i>Total</i>
Nyanza (Siriba)	..	..	..	..	51	39	90
Central (Embu)	..	..	..	..	35	25	60
Coast (Matuga)	..	..	..	..	15	18	33
Rift Valley (Kapenguria)	..	..	..	..	19	—	19
Total entered	..	..	..	..	120	82	202
Failed	..	..	..	..	28	15	43
Total passed					92	67	159

At Siriba two second-year students were dismissed during the year and of the remainder one South Nyanza student failed to reach the required standard at the examination. Of those who passed out at the end of the year 11 obtained credits and 27 obtained passes. Of the first-year students two were sent home during the year whilst the rest showed sufficient promise to return for the second year of training. It was noticeable that those first-year students who had done a year or more of field work before coming to Siriba showed greater promise than those straight from school although they were of equal educational standard. Greater emphasis is now being placed on practical work.

At Embu it was apparent during the first term that the standard of the first year students with the K.A.P.E. qualification was low and it was no surprise when 14 of these students failed to reach a satisfactory standard in the first term examinations. Four of these failures were given a chance to improve their work during the second term but the remaining ten were dismissed from the Training Centre. Twenty-four pupils finally sat the qualifying examination for entry to the second year of the course in 1957 and of these only 13 reached the required standard. Of the 25 pupils who sat the final examination only 11 reached a standard worthy of the award of the Department's certificate. This came as a great shock to the candidates but they had been warned regularly throughout the course that residence alone was not the main qualification.

At the Rift Valley Rural Secondary School at Kapenguria of the 19 first-year students who started the first course to be initiated here 15 remained at the end of the year to enter the second-year course. There will be no difficulty in recruiting 25 further students for the coming year.

At Matuga, as far as possible, entry into the school was confined to K.A.P.E. passes but in order to keep the numbers up a few failures were admitted. This was possible as candidates were first obliged to undergo a preliminary practical course in the districts, following which they had to appear before a District Selection Board. The results of better teaching based on a revised syllabus is providing the Coast Province with a much-improved standard of instructor.

Farm Institutes.—Thirteen trainees were in residence at the Bukura Farm Institute but shortage of funds and unfavourable weather resulted in a general deterioration in the management of the holdings. Likewise at the Kabianga Institute in Kericho District development was hindered by shortage of funds. At Kisii all but one of the 11 smallholdings was occupied by trainees during the year and a series of courses on coffee growing have been run at this institute. Development at Oyani was stopped owing to lack of funds and the institute placed on a "care and maintenance" basis. The Farm Institute side of Siriba Centre developed considerably during the year. All the holdings now have water laid on or immediately adjacent. The very small $3\frac{1}{2}$ -acre holding attracted much attention and it is considered that a man and wife could just manage this without any outside labour. The four stall-fed cows gave 6,991 lb. of milk in the year though not one is a high-quality beast. An interesting fact is that due to the bulk of the fodder provided for these cattle being Napier grass the greatest quantity of water taken by the animals on one hot day was four gallons; an average of 1.76 gallons per day only has been consumed over a period of six months. Results from a 2-acre intensive vegetable and stock holding at Kakamega indicate that to obtain a cash income above subsistence of £100 per annum per family at least four acres is required.

At Kaimosi in the Rift Valley Province the main buildings of the Farm Institute have been completed and three holdings have been laid out. It is hoped that the new Wambuga Farm Institute in Nyeri District will hold its first course for farmers in June, 1957.

School Gardens.—All districts in Nyanza Province report satisfactory co-operation from the Education Department in the improvement of agricultural teaching at both intermediate and primary schools. There has been a marked improvement in Central Nyanza where almost all the intermediate schools have planned holdings and nearly all primary schools have an adequate area of land provided.

In the Rift Valley Province a greater effort was made to improve the standard of school gardens and reasonable results have everywhere been achieved.

In the Central Province a number of intermediate schools in Meru District were surveyed for farm planning. As a result of "consolidation" all schools in Nyeri District are to be allocated ten acres of land of which seven to eight acres will be used as a school garden.

The standard of husbandry on intermediate school farms in Embu District was well maintained. Boran heifers purchased for these school gardens were allocated after the heifers had been initially put in calf at the Embu Seed Farm. School gardens in Fort Hall District have been revived and many are now back to pre-Emergency standards.

In the Southern Province close co-operation was maintained with the Education Department and the supervision of school gardens continued to receive priority attention, particularly in Machakos District.

In the Coast Province a special effort was made in Kilifi District to improve the teaching of agriculture in schools and to this end each school was issued with a blue-print plan of the school holding with details of the rotation to be followed. Despite this it was obvious at the end of the long rains that the majority of teachers were not responding to this assistance and were themselves not capable of teaching agriculture. To overcome this, short courses in agriculture were arranged for teachers in co-operation with the Education Department in both Kwale and Kilifi Districts, funds being provided by the District Education Boards.

Young Farmers' Clubs and Better Farming Societies.—There are no Young Farmers' Clubs as such in Nyanza Province, all the clubs which exist being composed of adult farmers. In Central Nyanza all divisions have Better Farming Societies which hold regular meetings and where in the words of the Assistant Director in charge of the Province: "Members generally take the opportunity of congratulating themselves that they are progressive and well ahead of everybody else. The Luo are remarkable people—in their own estimation". The societies established in the Wanga area of North Nyanza now have seven groups and 89 members and good progress was made with such societies in Elgon Nyanza. In the Kitale and Eldoret Districts field days and lectures were held for Young Farmers' Clubs and two new Young Farmers' Clubs were started at Eldoret.

In the Coast Province a Farmers' Club was formed in Kaloleni by 26 progressive farmers.

In the European areas a number of farmers' days and demonstrations were arranged in all districts within the Rift Valley Province, with special emphasis on farm planning. A particularly successful Planters Day was held at the Coffee Station at Ruiru early in the year and also at the Grassland Research Station, Kitale.

AGRICULTURAL SHOWS

The Royal Agricultural Society of Kenya held its annual show at Mitchell Park, Nairobi, to coincide with the visit of H.R.H. Princess Margaret in October. The Department contributed its own exhibit illustrating the work of consolidation of fragmented holdings in the Central Province as well as an horticultural exhibit and also organized the Farm and Dairy Produce and Farmers' Exhibits Sections.

An enterprising display was put on by the Department at the Mombasa Trade and Agricultural Exhibition with competitive District exhibits (won by Kilifi), as well as exhibits covering coco-nuts, vegetables, cotton and resettlement.

Successful shows were also held at Fort Hall and Kitui.

Marketing

PRODUCE MARKETING AND INSPECTION

Details of the quantities and value of the produce that passed through the markets in 1956 are given in Table D. The position in the African areas during the year was as follows:—

Nyanza Province.—The newly created Nyanza Province Marketing Board which commenced its official existence in September has agreed to take over all the produce inspection services from the African District Councils. There is no doubt that a well-organized unified inspection service throughout the province will have favourable results both in economy and efficiency. An important service to be rendered by the Board will be the provision of regular market intelligence. If this is well handled and the African producer can be kept in the picture a more varied production should result with a lessening dependence on the maize crop.

Rift Valley Province.—The appointment of the marketing Officer recorded in last year's report has proved to be an asset to the Province. As well as the marketing of cereals attention has been given to disposal of poultry, eggs, vegetables and potatoes with a consequent stimulation of producer interest. A ghee centre has been established in the Nandi District. An organization for the disposal of maize in the Baringo District has been established with an Inspector trained in Nyanza Province. Probably for the first time this district will have a surplus of maize and although long distances and difficult roads make marketing difficult production is likely to increase.

Central Province.—By the end of the year each district in the Province had a Marketing Officer—a great improvement on last year. This, with a corresponding increase in the African inspectorate, is already producing indications of an improvement in the quality and handling of surplus crops. The Senior Marketing Officer of Nyanza Province visited the Province during the year, making proposals for the further improvement of the marketing service which are now under active consideration.

Southern Province.—The Produce Inspection service of the African District Councils continued to deal with the main export commodities. The system is inefficient and will remain so until a Marketing Officer is posted to the Province.

Coast Province.—The Teita and Kwale Districts are the only two districts with an inspection service apart from the cotton inspection service at Malindi. All vegetables, chillies and wattle are inspected in the Teita District. The Kwale inspectorate examined 22,000 bags of produce including cashew nuts, kapok, cassava, copra and capsicums. Full inspection of the cotton crop was carried out by Departmental staff at all buying centres and high standards were maintained. The service is subsidized by the Cotton Lint and Seed Marketing Board. The marketing policy for the cashew nut crop was revised during the year and export was allowed with the licensing of four exporters.

CO-OPERATION

In South Nyanza 13 new Coffee Co-operative Societies have been formed. These societies are encouraged to handle not only the factory and sales side of the industry but also to assume a growing responsibility for the field production of the crop. The Transport Co-operative Union has merged with the Farmers' Union in the hope of achieving greater economy of operation. Eight Coffee Co-operatives have been formed in North Nyanza, but the Maize Co-operatives are tending to decline with the reduction in maize surpluses. The Shiambere Jaggery Co-operative has been formed and hopes to erect a mill in 1957 to process the quantities of cane planted in the area in recent years. The Kipsigis Traders Co-operative Union in Kericho District continued to prosper with a turn-over of approximately £5,000 per month.

The Wheat Co-operatives in Elgeyo and Nandi Districts of the Rift Valley Province continued to function satisfactorily and the potato crop in Elgeyo is now being handled by a Co-operative Society.

In the Central Province a number of new societies have come into being during the course of the year but the most remarkable enterprise in the Province is the Meru African Co-operative Union with a revenue from the 1955/56 coffee crop of £202,971.

With the appointment of an Assistant Registrar, the Co-operative Societies in the Teita Hills of the Coast Province have taken on a new lease of life, membership has increased, and better prices, particularly of chillies, have been obtained. A new society has been formed to cater for the marketing of produce from the Shimba Hills Settlement. The recently formed Malindi Farmers' Association is becoming a co-operative in an attempt to improve the marketing of members' produce.

GRADING AND INSPECTION SERVICES, MOMBASA

Inspection.—The number of packages of plants and plant products imported and inspected at Mombasa increased considerably from 267,427 in 1955 to 530,837 in 1956 and the value was correspondingly doubled. The increase was largely due to the importation of two shiploads of wheat, one from the Argentine and one from Australia. There was an increase in imports of fresh fruit. Imports of Italian apples dropped by nearly half but South African and Australian imports

rose considerably. The trouble in the Suez Canal resulted in a marked increase in the amount of onions imported from Egypt when dealers realized that the canal was likely to be closed. The volume of exports of castor seed continued to fall and Uganda exported little more than half the total for the previous year. The quantity of castor seed exported was 96,038 bags compared with 139,944 bags in 1955. The number of bags of known Kenya origin was 50,198 compared with 65,402 in 1955.

A large number of storage pests was collected and identified during the year. One such pest not usually found in Kenya was *Calandra granarium* which existed in a shipload of wheat from Australia. *Trogoderma granarium* was found in Zanzibar during the year and the necessary measures were taken to prevent the spread of this pest to Kenya.

A total of 703 phytopathological certificates were issued compared with 701 in 1955. These were mainly for hard coffee from Uganda, 332 being in respect of coffee exported to Egypt.

Grading.—The export of maize continued from the previous year with the undergrade shipment of 3,000 tons of yellow maize in January and a further 2,266 tons in early February. This completed the export programme for the season. All this maize was fumigated with methyl bromide. Thereafter the only shipments of maize were five lots of ungraded maize from Tanganyika amounting to 9,244 tons sent to Europe and two lots of 229 tons to Aden. One hundred and ninety-one tons of conditioned Uganda maize were sent to Japan in November. The new export season started in December with the shipment of 750 tons of K2 yellow maize to India in three lots and a further 300 tons of K3 yellow maize to Glasgow. Five hundred and sixty tons of K4 white maize were shipped to Antwerp on 30th December. All this maize was fumigated by Produce Control with methyl bromide.

Almost all the beans exported were of Tanganyika origin of the white haricot type. Both the quantity and the quality of these fell considerably. The total exports of potatoes rose by 14 per cent mainly owing to increased shipments of Tanganyika potatoes to Mauritius, Aden and Colombo. There were no exports of wheat overseas. Chillies from Uganda were still of poor quality although there was an increase in G.A.Q. chillies from the Coast. Capsicums from the Coast Province were generally of excellent quality.

PRODUCE GRADED FOR EXPORT (BAGS), 1955

						Maize	Wheat	Beans	Potatoes
K.1	..	..	..	..	..	—	504	—	—
K.2	..	..	..	..	..	—	200	1,339	7,510
K.3	..	..	..	..	..	—	1,784	16,677	—
K.4	..	..	..	..	..	—	573	—	—
K.5	..	..	..	..	..	—	499	—	—
K.6	..	..	..	..	..	—	—	724	—
K.8	..	..	..	..	..	28,109	—	—	250
Total Graded	..	..	..	..	..	28,109	3,560	18,740	7,760
Rejected	..	..	..	..	..	429	—	—	250
Total 1956	..	..	..	..	..	28,538	3,560	18,740	8,010
Total 1955	..	..	..	..	..	867,948	5,868	31,202	14,901

Figures for chillies graded are as follows:—

CHILLIES GRADED FOR EXPORT (BAGS), 1956

	<i>Capsicum minimum</i>	<i>Capsicum annuum</i>	Total
G.A.Q.	280	—	280
F.A.Q.	222	17,314	17,536
Undergrade.. ..	4,894	4,241	9,135
Total 1956	5,396	21,555	26,951
Total 1955	5,580	14,973	20,553
Total 1954	6,364	26,189	32,553

The main markets for chillies were London and New York while Ceylon continued to take most of the capsicums.

Conditioning.—Now that fumigation of grain is the accepted procedure prior to shipment the conditioning plant was idle for most of the year and will be closed down in 1957. Two thousand six hundred and ninety-eight bags of maize were conditioned and four small parcels of peas and gram amounting in all to only 1,125 bags. In addition, 1,371 bags of maize and 252 bags of gram were cleaned.

Fumigation.—The demand for fumigation of small quantities of produce was slightly greater than last year but now that there are two companies in Mombasa able to fumigate with methyl bromide the demand for the use of our fumigation chambers fell away towards the end of the year. The total number of bags of produce treated was 8,891 bags compared with 7,863 in 1955.

Finance.—The conditioning plant was idle for so much of the year that revenue fell from £1,568 to £327. The excess of expenditure over revenue was £3,625 in 1956. The grading services cost £3,342 to maintain and revenue earned was £816, this deficit was due mainly to a heavy decrease in the quantity of maize graded for export. Plant inspection, whose revenue is always small, continued to function at a loss but the revenue earned from the issue of certificates yielded £373 compared with £296 in 1955.

The Quelea Campaign

The Bird Control Officer of the Department arrived on transfer from Tanganyika in September in time to deal with a serious seasonal invasion of these grain-eating birds.

The birds, Sudan Dioch, *Quelea quelea aethiopica* began to arrive in plague proportions in late September and continuous waves arrived until the end of the year. With the help of prompt reporting by the farming community it was possible for the Control Officer to find and destroy roosts within a few days of the birds entering any area. It has been found that Diochs in Kenya prefer roosting in tall reeds or Napier grass whenever possible. When roosting in eucalyptus plantations or high bush the Tanganyika method using the fuel-bomb technique has been successful in blowing up the roosts. For birds roosting at low levels a modified procedure has had to be evolved and this has been achieved by increasing the weight of explosive charges round the sides of the roosts and cutting down the quantity of fuel. A slightly higher explosive, Dynagel, was found to be more satisfactory than the usual gelignite. Twenty roosts were blow up during the latter part of the year with an estimated kill of 4,500,000 birds. It is believed that very

few birds entering the wheat lands of the Colony survived the campaign. On a very conservative estimate the wheat saved from destruction is between 80,000 and 100,000 bags as the birds would in some cases have had 100 days on the crops had they not been destroyed.

It has been established that the large majority of this season's infestations came from Tanganyika via the Rift Valley. Examinations of specimens were made to obtain data on breeding plumage changes and gonad development and in particular migratory movements in relation to climatic conditions and availability of food supplies. Observations have been made on general behaviour and investigations continue on plumage changes, crop analyses, and time taken for complete ossification of the skull to determine age. The Control Officer, who is also undertaking the biological investigations, maintained close liaison with the other workers on the Continent who are dealing with the *Quelea* problem.

PART IV—GENERAL

Library

Only some 150 books (including bound volumes of periodicals) were added to the library during the year, a decrease of 50 over the previous year which reflects the continued rise in costs, both of the books themselves and of subscriptions to periodicals. Loans showed a decrease on the previous year; the move to the new offices in the middle of the year was probably one of the main causes of this. Four issues of the departmental *Newsletter* appeared during the year. The exchange scheme continued to function satisfactorily.

The year cannot be described as one of satisfactory progress in all respects. A suitable assistant was at last obtained in the middle of the year, with the intention of training her to take over from the librarian while on leave and as a replacement in this (or any other) department if and when the need arises. Vigorous attempts were made from the beginning of the year to persuade Government to introduce a scale for library assistants or at least to make possible their advancement. No decision had been reached by the end of the year, but the matter was still under consideration.

The library was expected to (and did) continue to function during a wholly chaotic move, admittedly with some delays in the distribution of material to outstations. It will be many months before the confusion caused by exceedingly willing, but totally unskilled, help in shifting the books and particularly the pamphlet boxes, can be reduced to order. A complete lack of storage space and office accommodation means that it will be difficult to keep what is potentially a pleasant, if not particularly suitable, library room looking as tidy and well ordered as the librarian would desire.

Publications

The following is a list of articles by departmental officers published during the year:—

Bock, K. R., and Rayner, R. W.—Control of Coffee Berry Disease in Kenya. *Nature*, 178 (4526) p. 217, 1956 (letter).

Bumpus, E. D.—Grassland research. *The Kenya Farmer*, Sept., 1956, p. 11.

De Lotto, G.—A new *Ceroplastodes* (Hom: Coccoidae) from Kenya. *J. ent. Soc. Southern Afr.*, 19 (2) (1956).

——— New Diaspidini (Homoptera: Coccoidae: Diaspididae) from Kenya. *Proc. R. ent. Soc. Lond.*, (B) 25 (1956), pp. 17–24.

——— The identity of some East African Species of *Saissetia* (Homoptera: Coccoidae). *Bull. ent. Res.* 46 (1956), pp. 239–249.

- Dixon, G. E.—Summary and review of the co-operative maize trials East Africa, 1955. Paper submitted to the Specialist Committee on Agricultural Botany, April, 1956.
- Dougall, H. W.—Crude fibre: its determination and place in the analysis of animal feedingstuffs. *E. Af. agric. J.* 21, 225, 1955–56.
- Henderson, G. R.—Intercropping with Maize for Silage—*The Kenya Dairy Farmer*, v. 3, No. 3, p. 5.
- Seven-year bean interplants well with maize. *The Kenya Dairy Farmer*, v. 3, No. 4, p. 5.
- Jackson, Barbara E.—Berryfruit in Kenya. *E.A. Field, Farm and Garden* 22, 217 (32), 1956.
- Five acres: Strawberries for your land. *E.A. Farmer and Planter*, v. 1, No. 1, p. 53.
- Some notes on asparagus-growing in Kenya. *E.A. Field, Farm and Garden*, v. 22, No. 215, June, 1956.
- Jaskson, T. H.—Horticulture. *The Kenya Farmer*, Sept., 1956, p. 55.
- Jones, P. A.—Notes on the varieties of *Coffea Arabica* in Kenya. *Coffee Board Monthly Bulletin*, 21, 305, 1956.
- Kockum, S.—The Khapra Beetle. *K.I.O. Fortnightly*, No. 420, 16th October, 1956, (4244).
- Kroll, U.—Some notes on phosphate responses in pyrethrum. (Booklet published by the Pyrethrum Board of Kenya).
- Lerche, K.—The Agronomics of Sisal. (Reprint of lectures delivered at Egerton Agricultural College). *Kenya Sisal Board Bulletin*, No. 17, p. 34, No. 18, p. 36.
- Weeding in Sisal Fields. *ibid.* No. 15, p. 36.
- McCrae, D. M.—Coffee lacebug in the Central Province. *Coffee Bd. Bull.*, 21, 277.
- Pereira, H. C., and Jones, P. A.—A tillage study in Kenya coffee in *Coffee Bd. Bull.* 21, 37 and 69, repr. fr. *Emp. J. exp. Agric.*, v. 22, No. 87–88, 1954.
- Letter to the Editor (The effect of mulch). *Coffee Bd. Bull.*, 21, 74.
- Rayner, R. W.—Leaf rust. *Coffee Bd. Bull.*, 21, 66.
- Robinson, J. B. D.—Chemical control of weeds in coffee. (A further short report.) Pesticides Abstracts and News Summary, section C., 2, 128.
- Rapid Kjeldahl nitrogen digestion of coffee-leaf material by the permanganate method. *The Analyst*, May, 1956, v. 81, No. 962, pp. 316–318.
- Recent results of experiments with weed-killers in coffee. *Coffee Bd. Bull.*, 21, 249.
- Robinson, J. B. D., Brook, T. R., and de Vink, H. H. J.—A cultivation system for ground-water (*vlei*) soils. *Coffee Bd. Bull.*, 21, 9 (reprinted fr. *E. Afr. agric. J.*, v. 21, No. 2, 1955).
- Robinson, J. B. D., and Melville, A. R.—The effect of rainfall and other factors on coffee production and yields in Kenya, 1947–1955. *Coffee Bd. Bull.*, 21, 96.

- Strange, R.—Grass Husbandry: Perennial dry season leys for mixed farming areas at medium altitude. *The Kenya Farmer*, Nov., 1956, p. 15.
- Mechanical appliances for ley establishment. *R.A.S.K. Qrly. J.*, No. 9, p. 19, Feb., 1956.
- Stephen, I., Bellis, E., and Muir, A.—Gilgai phenomena in tropical black clays of Kenya. *J. Soil Sci.*, 7 (1), 1956.
- Thorpe, H. C.—Cereals in Kenya, 1956/57. *Kenya Weekly News*, 27th January, 1956, p. 37.
- New cereals for multiplication. *K.I.O. Fortnightly*, No. 403 (4102)
- Release of new Cereals. *ibid.* (4103).
- Thorpe, H. C., and Dixon, G. E.—Release of new Cereal varieties, 1955/56. *E. Afr. agric. J.*, 21, 164.
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Agricultural Legislation

The most important legislative measures enacted during the year were:—

The Cereal Producers (Scheduled) Areas Ordinance, 1956.—It was considered desirable that a statutory body should be set up to take over the functions of the European Producers Interim Cereals Board. Part I of the Ordinance is concerned merely with defining terms used in the Ordinance, Part II is concerned with the establishment of the statutory body—the Cereal Producers (Scheduled Areas) Board and its functions are defined as including the doing of all such things as are necessary, advantageous, proper or for the benefit of cereal producers and in particular the stabilization of cereal prices; the assisting of cereal producers; with the approval of the Minister, the investigation and research into all matters relating to the growing of cereals and the negotiation of cost structures and producer prices. The Board must convene cereal production area meetings of registered cereal producers in each area once every year. Part III concerns finance, and provision is made for the Minister, on the recommendation of the Board, to levy a cess on any cereal grown or cultivated in the Scheduled Areas. Part IV is concerned with the registration of cereal producers and Part V deals with various general provisions such as returns, and the Minister's power, with the approval of the Board, to make rules for the better carrying out of the purposes and provisions of the Ordinance, in particular in respect of—

- (a) prescribing and defining cereal production areas both in general and in relation to any particular cereal;
- (b) prescribing procedure to be followed in the election of members;
- (c) prescribing the cereals to which the Ordinance applies;
- (d) prescribing the quantity of any cereal to be grown to entitle a cereal producer to registration;
- (e) prescribing any fee, matter or thing which is to be or ought to be prescribed under the Ordinance.

The Pyrethrum Ordinance, 1956.—The existing Pyrethrum Ordinance was enacted in 1938, and, although it had been amended from time to time, it now became necessary to replace it owing to the development of the pyrethrum industry in Kenya.

The new Ordinance establishes the Pyrethrum Board of Kenya, and determines the functions and powers of the Board. The objects of the Board are those of doing all such things and of carrying on all such activities as are calculated to benefit pyrethrum growers and the pyrethrum industry.

The Board is expected to make profits from its various activities, but it may also be financed by the raising of a levy and a cess on all pyrethrum grown in Kenya. In return for a levy paid to the Board, the pyrethrum grower will be issued with stock, which will carry interest and entitle the stockholder to share in surplus funds should the Board at any time be wound up.

The Ordinance also provides for the control and regulation of the pyrethrum industry, which is achieved by requiring every pyrethrum grower to be licensed, and by ensuring that all pyrethrum grown in Kenya is delivered to the Board.

For convenience the Ordinance is divided into five parts. Part I is introductory. Part II establishes the Pyrethrum Board of Kenya and makes the necessary provision concerning its constitution, functions and powers. Part III deals with the control and regulation of the pyrethrum industry. Part IV concerns the finances of the Board, whilst Part V is general.

The following comprise the other more important legislative enactments affecting agriculture during the year:-

The Agriculture (Amendment) Ordinance, 1956, effects certain amendments to the Agriculture Ordinance, 1955, the need for which became obvious during its operation in the past year. Most of these are concerned with administrative details; the one of most practical importance being clause 13 which amends section 109 to empower the Minister to declare as essential those crops which are properly planted, in the interests of good land management, as rotational or alternative crops.

The Land and Agricultural Bank (Amendment) Ordinance makes certain amendments to the main Ordinance which experience has shown are desirable. The Board is given sole responsibility for the appointment and terms of service of its officers and clerks and various other amendments are connected with this. One concerns the common seal of the bank and another permits the Bank to accept money on deposit; the title of the chief executive officer is changed from Secretary to Manager.

The Wheat Industry (Amendment) Ordinance.—The 1952 Ordinance was enacted to regulate the sale and distribution of wheat and to licence and control the milling of wheat. Experience showed that certain amendments and additions to the Ordinance were desirable. It has been found necessary to impose conditions on the construction, enlargement or alteration of mills, in order to ensure that the total capacity of all mills in the Colony does not exceed the total quantity available for milling, and it is made clear that no allocations will be increased until such construction, etc., has been completed. Provision is made for temporary allocations of wheat to meet certain circumstances such as those which may follow the destruction by fire of a large flour mill and additional allocations, to enable the Minister to allocate any quantities of wheat surplus to the fixed or basic allocations. The delivery of wheat to any person except an agency is prohibited though certain deliveries made for the purposes of storage, transport, or reconditioning, or in compliance with an order of the Minister or of an appointed agency are exempted.

The Cotton Lint and Cotton Seed (Powers of Supervisors) Regulations, 1956, provide for the supervision of such arrangements for the purchase, sale and export of cotton lint as may be required by the Board; the inspection of seed cotton, cotton lint and cotton seed, held by ginners, the inspection of ginning, the taking of samples and the certification of weights and qualities of cotton lint and cotton seed as may be required by the Board.

The East African Income Tax (Management) Act, 1952.—Under this act an exemption order is made, exempting from tax the income of the Cotton Lint and Seed Marketing Board.

The European Agricultural Settlement Regulations, 1956, revoke the 1949 Regulations. The conditions to be fulfilled by an applicant are first laid down and the terms are then given of the two schemes administered by the Board—the Tenant Farming Scheme, and the Assisted Ownership Scheme. General provisions relating to advances are also laid down.

The Export Duty (Coffee, Cotton and Sisal Fibre) (Abolition of Duty) Order, abolished the export duty on the crops cited from 1st July, 1956.

The Export and Grading of Beans Rules, 1956.—These replace the old rules under the Agricultural Produce (Export) Ordinance and embody such revisions and amendments as experience has shown to be desirable.

The Grading of Maize for Export Rules, 1956.—These replace the old rules under the Agricultural Produce (Export) Ordinance and follow the same general lines. New provisions cover the definition of terms used in the Rules, the tests to be used in grading maize, seed maize, maize originating in Uganda and Tanganyika; the Schedule has been completely revised.

The Importation Regulations (Zanzibar) Order, 1956.—This Order, under the Plant Protection Ordinance, was made to prevent the introduction into Kenya from Zanzibar of the pest *Trogoderma granarium* by prohibiting the import of any part of a plant, seed, grain or crop or any box, bag, sack or other container containing or having contained such part of a plant, etc., or any container which might harbour the pest, without first submitting it to an inspector at the port of entry.

The Land Preservation (Scheduled Areas) Rules, 1956.—These Rules replace the old Land and Water Preservation (General) Rules, and empower the Director, with the approval of the Agricultural Sub-Committee concerned to issue a Land Preservation Order to any owner or occupier of land for any of the purposes set out in section 58 of the Agriculture Ordinance, 1955, requiring or prohibiting certain acts or things. The form of order is set out in the Schedule to the Rules.

The Production of Food Crops Rules, 1956.—These Rules are concerned with the conditions to be laid down in Production Orders, the form for which is prescribed, the form in which returns of essential crops are to be made, the conditions under which guaranteed minimum returns shall be paid, latest planting and claim dates, and the notification of crop failures.

The Pyrethrum (Rights, Issue, Transfer and Redemption of Stock) Rules, 1956.—As the title implies, these Rules cover the conditions under which stock may be issued to licensed growers, its transfer and redemption.

The Pyrethrum Rules, 1956.—These Rules lay down election areas, prescribes the form of grower's licence, amount of licence fees, the form on which returns shall be made, the grading of pyrethrum and pyrethrum products, and the duties of stockholders towards the Board.

Staff

Headquarters officers moved in August to the new Agriculture House, in Coronation Avenue. There were several changes in Headquarters staff during the year. Mr. A. R. Melville was appointed Chief Research Officer early in the year. Mr. G. M. Roddan went on leave pending retirement in June after steering the Department through the difficult years of the Emergency and latterly a period of considerable expansion in the services provided by the Department. We wish him all success and happiness after his arduous years in Kenya. Mr. R. J. M. Swynnerton was promoted Director towards the end of the year after acting for the Director since June, and Mr. L. H. Brown acted as Deputy. Mr. Swynnerton proceeded on leave in December and at the end of the year Mr. Brown was acting Director, Mr. B. C. Wills acting Deputy Director, and Mr. T. Bell acting Assistant Director.

The Department was sorry to lose Mr. P. V. M. Quiggin, Chief Grader and Inspector, who proceeded on leave pending retirement in August, Mr. J. P. Benson, Senior Assistant Agricultural Officer for many years at Meru, who retired in April, and Mr. G. S. Cowley, Assistant Director in charge Coast Province, who resigned in December.

The following new Agricultural Officers joined the Department during the year:—

Messrs. B. F. Hanger, R. H. Bennison, D. J. Pratt, D. Juckes, J. R. Goldsack, R. J. Jones, I. M. Johnson, J. Morrison, B. D. Dowker (Plant Breeder) and P. G. Dennison. Mr. J. W. Haylock came on transfer from Tanganyika in September as Bird Control Officer and Biologist (Bird Control). Mr. J. McDonald came out of retirement from the Colonial Agricultural Service in March to fill an Agricultural Officer vacancy in Headquarters.

Recruitment of Assistant Agricultural Officers improved during the year and at 31st December only seven vacancies remained to be filled in the Colony Estimates and ten vacancies in the Development and Swynnerton establishments.

The staff of the National Institute of Agricultural Engineering's East Africa Testing Unit arrived in the latter part of the year to set up the tractor and implement-testing unit to be based at Nakuru. The staff comprises an Officer in charge, Mr. S. D. Minto, a Senior Experimental Officer, Mr. J. S. Rideout, and two Technical Assistants, Messrs. S. W. Cooper and P. F. C. Scott. This staff is administered by this Department on behalf of the Directors of Agriculture of the East African Territories, the work of the Unit being under the technical guidance of the N.I.A.E. at Silsoe, Bedfordshire, England. Mr. Minto is serving on secondment from the Tanganyika Agricultural Corporation.

Once again it is a pleasure to place on record the good work of all members of the staff of the Department at a time of ever-increasing demand for their services, and to express my thanks for the enthusiasm and drive attending their efforts.

Nairobi,

11th February, 1957.

L. H. BROWN,

Acting Director of Agriculture.

